

# ENDEMİK BÖLGEDEN GELEN ÜNİVERSİTE ÖĞRENCİLERİNİN SITMA İLE İLGİLİ BİLGİ DÜZEYLERİ VE DENEYİMLERİNİN DEĞERLENDİRİLMESİ

## Evaluation of Knowledge and Experiences About Malaria from University Students of Endemic Countries

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### ÖZET

**Amaç:** Ondokuz Mayıs Üniversitesi'nde sıtma endemik bölgeden gelen yabancı uyruklu öğrencilerin sıtma deneyimlerini ve bilgi düzeylerini ölçmek

**Gereç ve Yöntem:** Hastalıkları Kontrol ve Koruma Merkezi (CDC) tarafından sıtma endemik olarak kabul edilen ülkelerden gelen öğrencilerin demografik verileri, sıtma deneyimleri ve bilgi düzeylerinin değerlendirildiği anket yüz yüze yapılmıştır.

**Bulgular:** Endemik bölgeden gelen 750 öğrenciden ankete katılmayı kabul eden ve anketi eksiksiz dolduran 106'sı değerlendirmeye alınmıştır. Katılımcıların yaş ortalaması 23 ( $\pm 3,5$ ), 77 (%72.6)'sı erkekti. Ülkesi endemik kategoride olsa da 13 (%12.3) öğrenci ülkesinde hiç sıtma görülmediğini ifade etmiştir. Katılımcıların 48 (%45.3)'ünün yaşamı boyunca ortalama 2.4 $\pm$ 4.5) defa sıtma geçirme öyküsü vardı. Yedisinin profilaksi altında sıtma öyküsü bulunmaktaydı. Sıtma geçiren öğrenciler en sık Artemether-lumefantrin (10) ve klorokin (9) tedavilerini kullanmıştır. Kırk yedi (%43.3)'ü profilakside kullanılan en az bir sıtma ilacına aşınaydı. Katılımcıların %16'sı ülkelerinde sıtma ilaçlarına ulaşılabilirliği zor olarak ifade etmiştir. 'Sıtma ölümcül bir hastalık mıdır?' sorusuna %84.9 oranda evet yanıtı alınmıştır.

Öğrencilerin 20'si tıp fakültesinde okumakta olup, 15'inin sıtma geçirme öyküsü vardı. Sıtma ile ilgili bilgi düzeyleri değerlendirilen tıp öğrencilerinin %70 (14)'i Afrika ülkelerinden gelmekteydi. Tıp öğrencileri sıtmanın %95 (19) oranda anofel türü sivrisineklerin ısırması ile, %60 (12) kan nakli, %70 (14) anneden bebeğe bulaş ve %15 (3) organ nakli ile bulaştığını belirtmiştir

**Sonuç:** Bu sonuçlar tıp öğrencileri de dahil olmak üzere endemik bölgeden gelen öğrencilerin sıtma ile ilgili bilgi düzeylerinin artırılması gerekliliğine işaret etmektedir.

**Anahtar kelimeler:** Sıtma; Bilgi düzeyi; Yabancı uyruklu öğrenciler

### ABSTRACT

**Aim:** The aim of this study was to evaluate experiences and level of knowledge about malaria among Ondokuz Mayıs University students from endemic countries.

**Material and Methods:** Face to face questionnaires were conducted asking questions about malaria demographic data, basic knowledge of its transmission, treatment, fatality and personal experiences from foreign students coming from countries considered to be malaria endemic by the Center for Disease Control and Protection.

**Results:** Of the 750 students from the endemic region, 106 accepted to participate and completed the questionnaire. The mean age of the participants was 23 ( $\pm 3.5$ ) and 77 (72.6%) were male. Thirteen (12.3%) of students from endemic regions stated that malaria was not observed in their countries. Forty nine (45.3%) of the participants had a history of malaria at an average of 2.4 ( $\pm 4.5$ ) times during their lifetime. Seven participants had a history of malaria despite the use of chemoprophylaxis. Artemether-lumefantrine (10) and chloroquine (9) were commonly used antimalarials by students. Forty-seven (43.3%) of the participants were familiar with at least one malaria drug used in prophylaxis. Of them 16% (17) stated that accessibility to malaria drugs was easy. The question whether malaria is a fatal disease was answered as yes by 84.9% (n = 90) of the participants. Of the twenty medical student participants, 15 had a history of malaria and 70% (14) of them were from Africa. Medical students students stated that malaria was transmitted by; 95% (19) anopheles type mosquito bite, 60% (12) blood transfusion, 70% (14) transmission from mother-to-infant and 15% (3) through organ transplantation.

**Conclusion:** These results indicate that students from endemic areas, including medical students, should increase their knowledge about malaria.

**Key words:** Malaria; Knowledge; Foreign students

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## INTRODUCTION

Malaria is a widely spread zoonotic disease. It is a major public health problem especially in the endemic areas mainly Africa, India subcontinent, Southeast Asia, Central and South America, Middle East and Hispaniola (1). According to the recently published World Malaria Report by World Health Organization (WHO) 219, million cases and 435000 related deaths in 2017 have been reported. It is a transnational threat not only a problem for endemic countries (2). It has been known that 80% of the malaria cases and 91% of the deaths occur in sub-Saharan Africa. 86% of the deaths being children less than 5 years of age (3). In the United States estimated 1700 cases of malaria are diagnosed every year, the majority of them being travelers and immigrants returning from sub-Saharan Africa and South Asia (4). Although malaria has been eradicated from Turkey since 2011, occupational travelers have been notified each year (5). The prophylactic antimalarial drug usage rates of the cases with imported malaria point out the lack of knowledge and inadequate attitude (5,6). Elimination is the only solution for this widely spread threat, therefore community intervention is essential. Knowledge, awareness, and practices with regard to malaria have been previously investigated in the rural areas (6). Knowledge of the residents in malaria-endemic countries varies from poor to high (7). We aimed to evaluate the knowledge level of foreign university students from endemic regions.

## MATERIALS AND METHODS

This study was conducted at Ondokuz Mayıs University in Samsun. Local ethics committee approval was received.

A standard structured questionnaire was prepared to evaluate experiences and knowledge levels of the foreign students coming from countries considered to be endemic for malaria by the Center for Disease Control and Protection (CDC). Of the 750 students from the endemic region, 106 accepted to participate and completed the questionnaire. The survey was conducted face to face. The questionnaire is given in Table 1.

Statistical analyses were performed using IBM SPSS v21. The rates of knowledge regarding malaria and demographic data of the students were presented as frequencies and proportions.

## RESULTS

The mean age of the participants was 23 ( $\pm$  3.5) and 77 (72.6%) were male. Most of the students (70.8%) came from African countries such as Somalia (12), Ethiopia (8), Tanzania (6), while 29.2% were from endemic Asian countries mainly Afghanistan (17) and Indonesia (4). 49 (46.2%) of the participants were Turkish language preparatory students. The faculties of the participants are listed in Table 2. The survey was conducted to students coming from countries considered to be malaria endemic by the CDC. Although all the participants have been selected from countries included in the endemic category, 13 (12.3%) students stated that they have never seen malaria in their country. These students were from Algeria (5), Mali (2), Afghanistan (1), Sudan (1), South Africa (1), Guinea (1), Tunisia (1) and Chad (1).

Forty eight (45.3%) of the participants had a history of malaria at an average of 2.4 ( $\pm$ 4.5) times during their lifetime. Seven had a history of malaria under the prophylaxis. Overall 48 (45.3%) had malaria in their lifetime while 58 (54.7%) never suffered from it. From those who were infected, 9.4% had it once, 6.6% twice, 10.4% thrice, 4.7% four times, 7.6% more than 10 times in their lifetime. Seven (6.6%) of the participants had malaria in spite of taking chemoprophylaxis.

Seven of the students who had malaria did not remember how the diagnosis was made. Six of them had a rapid diagnostic test, 27 had only peripheral blood smears (thick and thin) and 8 had a rapid diagnostic test together with peripheral smear. According to the frequency, the most common drugs used were Artemether-lumefantrin (10), chloroquine (9), quinine (4), Artemether (3), Mefloquine (1). 21 participants did not remember the names of the drugs used in their treatment. The average duration of treatment was 3 (1-5) days. The level of knowledge of participants about the transmission route is evaluated in table 3.

**Table 1.** Questionnaire

AGE:	GENDER:		
NATIONALITY:			
UNIVERSITY-FACULTY-GRADE:			
Is malaria seen in your country?	YES:	NO:	I DON'T KNOW:
Have you ever suffered from malaria?	YES:	NO:	
If the answer is YES:			
How many times:	When:		
How was diagnosed? a. Peripheral smear    b. Rapid diagnostic test    c.No test performed    d. I don't know			
Which medicine was used in the treatment?			
How many days was the treatment for?			
Have you ever traveled to other malaria endemic regions?			
If the answer is YES			
Name of the country :			
Did you receive any information about malaria before travelling ?(where -who from)?			
Which of the following are transmission ways of malaria?			
a. Anopheles spp mosquito bites:			
b. Blood transfusion:			
c. Contaminated food and water:			
d. Nosocomial (hospital induced) :			
e. Vertical transmission from mother to fetus (Acquired congenital disease):			
f. common use of the contaminated needle:			
g. Organ transplantation:			
h. Sexual intercourse:			
Which of the following is/are used as malaria drug(s):			
a. Artemether-lumefantrine		b. Artesunate	
c. Mefloquine		d. Dihydroartemisinin	
e. Atovaquone-proguanil		f. Quinine	
g. Chloroquine			
h. never heard any of them			
Have you ever used protective medication for malaria:		YES:	NO:
Which of the following is/are used as malaria protective drug(s):			
a. Atovaquone-proguanil		b. Mefloquine	
c. Doxycycline		d. Chloroquine	
e. Hydroxychloroquine		f. Primaquine	
How is the accessibility of malaria medicines in your country?			
a. easy    b. difficult    c. not accessible    d. i don't know			
(please write the reasons of inaccessibility:			
Is malaria a fatal disease: YES:		NO:	
Is malaria seen in turkey? YES:		NO:	
Is there other regions where malaria is a endemic outside Africa?			

**Table 2.** Distribution of students according to their faculties

Faculty	Frequency (%) n=106
Turkish language and literature	48(45.3)
Medicine	20 (18.9)
Biotechnology	2 (1.9)
International trade	3 (2.8)
Engineering	17 (16.0)
Tourism	1 (0.9)
Theology	2 (1.9)
Public administration	1 (0.9)
Language education	1 (0.9)
Psychological counseling and guidance	1 (0.9)
Nutrition and dietetics	1 (0.9)
Business administration	1 (0.9)
Biology	2 (1.9)
Statistics	2 (1.9)
Mathematics	1 (0.9)
Economy	2 (1.9)
Dentistry	1 (0.9)

**Table 3.** Responses of survey participants about routes of malaria transmission

Transmission way	Yes, n (%)	No, n (%)
Anopheles mosquito bite	91 (85.8)	15 (14.2)
Blood transfusion	39 (36.8)	67 (63.2)
Contaminated water and foods	36 (34)	70 (66)
Hospital-induced infection	6 (5.7)	100 (94.3)
From mother to infant	22 (20.8)	84 (79.2)
Common use of contaminated injectors	20 (18.9)	86 (81.1)
Organ transplantation	13 (12.3)	93 (87.7)
Sexual intercourse	7 (6.6)	99 (93.4)
I have no idea about the route of transmission	3 (2.8)	103 (96.2)

In order to evaluate the familiarity of malaria medicines, the drugs were mentioned one by one to the participants, 42 (40%) of the students recognized chloroquine, 42 (40%) quinine, 16 (15%) mefloquine, 9 (7.5%) artesunate, 10 (%9.4) dihydroartemisinin and 8

(7.5%) atovaquone-proguanil. 47 (43.3%) were familiar with at least one malaria drug used for prophylaxis. Participants stated that accessibility to malaria drugs was 65.1% (n = 69) easy, 16% (n = 17) difficult and 18.9% (n = 20) had no opinion concerning the accessibility of the drugs. Of them 84.9% (n = 90) stated that malaria is a fatal disease. Seventy percentages of the students stated that malaria is endemic in other countries outside the Africa and 19 (17.8%) stated that malaria is also seen in Turkey.

Of the twenty medical student participants, 15 had a history of malaria and 70% (14) of them were from Africa. 75% (15) of them were ≥ 3-year medical students. Medical students responded the transmission route of infection as; 95% (19) mentioned anopheles mosquito bite, 60% (12) blood transfusion, 70% (14) transmission from mother-to-infant and 15% (3) through organ transplantation.

## DISCUSSION

Malaria is a parasitic disease responsible for the deaths of millions of people in endemic areas. Malaria-related mortality varies between 2% to 19% in the endemic countries (2). It is vitally important to know main features of malaria especially for the residents in endemic region. While 84.9% of the students considered malaria as a mortal disease, 15.1% did not consider it as a life-threatening disease. Whereas all participants were from endemic areas, 48 (45.3%) had experienced malaria at least once during any period of their lives. In South Africa it has been known that it might be mortal if not treated (8). In a different study from Africa, it was demonstrated that 90.7% of the respondents believed that malaria might be mortal if it is not treated properly<sup>6</sup>. In the questionnaire we did not emphasize whether the disease treatable or untreatable. But it is known that malaria caused by Plasmodium falciparum may be mortal especially in the lack of early initiation of the appropriate treatment.

WHO aims to reduce the number of cases and mortality by at least 90% in 2030, and to eliminate malaria at least from 35 countries (2). One of the most important parameters of elimination is awareness. In this study, 84% of all students from the malaria-endemic region

stated that malaria is endemic in their own country. The second parameter is the availability of drugs. Although the respondents were generally familiar with antimalarial drugs, 16% stated that access to drugs was limited. In the present study, 42 (40%) of the respondents knew chloroquine and 42 (40%) quinine as drugs used for malaria treatment. In a study with similar results from India, 44.9% and 59.5% of respondents know chloroquine and quinine as most common medicines used in the treatment of malaria (9).

Overall 91 (85.8%) of respondents stated that malaria is transmitted by Anopheles mosquito bite, 39 (36.8%) blood transfusion, 36 (34%) contaminated water and food, 22 (20.8%) mother to fetus and 6 (5.7%) hospital-acquired infections, respectively. Regarding transmission route of infection in different endemic areas revealed similar results. In northeastern Ethiopia, 85.2% (242/426) of respondents attributed the cause of malaria to a mosquito bite. However, remained respondents associated the cause of malaria with chewing maize stalk (33.8%), hunger (33.1%), lack of personal hygiene (23.2%) and exposure to cold weather (13.7%). Of them 48% of the respondents mentioned that malaria could be transmitted from person to person (7). Previously published survey studies have also shown that mosquito bite is known as most common route of transmission by the participants (3,10-12). Although female Anopheles mosquito bite is the most common cause of transmission rarely, it may also be transmitted through other ways such as; blood transfusion, the use of contaminated needles, transplantation, nosocomial or vertical transmission (13). Knowing the ways of transmission is very important for understanding and applying the basic principles of protection in society. Prior studies from Cameroon, Ghana, Mumbai, Ethiopia, and Iran demonstrated that high proportion of the respondents mentioned eating contaminated food and drinking contaminated water as factors leading to malaria (3,9,11-13). Contaminated water and nutrients undoubtedly carry risks for transmission of infections but not for malaria. Knowing that the transmission will not occur by the gastrointestinal tract or by inhalation of polluted air or by sex is as important for the behavioral establishment of the people living in the endemic region.

One of the most important points of this survey is that the respondents also consist of students from the medical faculty. Twenty participants were medical students and 15 (75%) had a history of malaria. Half of the medical students thought that Turkey is still endemic while 5% were not aware of their own country's endemicity. Although not all, 95% of the participants stated the transmission way to be by anopheles mosquito bite, but unfortunately, the level of knowledge about other rare transmission routes was low. There are two main reasons for this; the first is that the theoretical knowledge about malaria is given to students in their third medical year. Since 25% of the medical students who participated are in the first two years of medical school, they have not taken any courses related to malaria yet. Secondly, although 75% (n = 15) of them were  $\geq$  3rd medical year, they were not asked whether they had taken this course by the time the survey was being done. However, a more comprehensive survey was planned to clarify this issues.

Malaria is a preventable and curable disease. While the general awareness and knowledge about malaria and is considered high, still some educational measures and implementations may be considered. It is important and necessary to increase the level of health knowledge of young people who will take role and contribute to this awareness in the near future in terms of social awareness.

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