

Exploring Physicians' Knowledge, Attitudes, And Practices On Travel Medicine In Jeddah, Saudi Arabia

Shaymaa A Abdalal, MD, PhD* Hatoon A Niyazi, MD, PhD** Moroj A Aldarmasi, MD, SBPM* Abdulrahman S. Obaid, MD*** Shoroug E. Ibrahim, MD, AFPM**** Nasser R. Algahtani, MD*** Mohammed K. Alnajrani, MD*** Sohail A. Alkhudaidi, MD***

ABSTRACT

Objective: This study evaluates the knowledge, attitudes, and practices (KAP) of travel medicine among physicians in Jeddah, Saudi Arabia, highlighting its importance in preparing travelers for potential health issues.

Methods: A cross-sectional study was conducted among physicians working at King Abdulaziz University Hospital (KAUH) from May to October 2023. A validated self-administered electronic questionnaire consisting of demographic data and questions to test KAP levels was distributed to the participants. A P-value less than 0.05 was considered statistically significant.

Results: The study included 103 physicians, predominantly male (69.9%) and Saudi (96.1%), with a mean age of 28.98 years and an average of 4.12 years of experience. Most held bachelor's degrees (57.7%). The total knowledge score averaged 100.12 out of 215, the attitude score averaged 32.53 out of 45, and the practice score averaged 15.10 out of 30. Significant associations were found between total knowledge scores and age, educational level, position, and years of experience ($p=0.015$, <0.001 , 0.002 , and 0.004 , respectively). Gender, educational level, and department significantly impacted attitude scores ($p=0.023$, 0.011 , and 0.045 , respectively). Educational level and department also significantly influenced practice scores ($p=0.011$ and 0.016 , respectively).

Conclusion: Our study reveals a suboptimal level of knowledge and practice with a positive attitude towards travel medicine among physicians at KAUH. These findings suggest the need to integrate travel medicine as a formal medical education and training program.

Keywords: Attitude, Knowledge, Practice, Physicians, Travel medicine

INTRODUCTION

The international travel rate continues to increase with about 1087 million travelers worldwide in 2013 [1]. The gradual increase in international travel has led to more travel-related illnesses, infectious diseases, and other health issues [1,2]. Travel-related illnesses include malaria prevention, travelers' diarrhea, enteric infections, yellow fever vaccination, and COVID-19 [3]. The disease incidence depends on several factors such as travelers' age, general well-being, and length of the trip. The visited country's altitude, temperature, and infection profile also play a vital role [4].

Increased international travel can lead to an increase in infectious diseases worldwide. Therefore, the growing number of infectious diseases and their potential impact on travelers and the community are challenges to the worldwide health system [5-8]. Clearly, there is a need for more knowledge and awareness of infectious diseases and travel medicine [9].

Travel medicine is a rapidly evolving field encompassing infectious disease, public health, tropical medicine, wilderness medicine, and epidemiology. It protects traveler's health and prohibits diseases and any health issues among travelers worldwide. It also requires more

knowledge and awareness among healthcare providers regarding non-infectious and infectious diseases, health regulations, and vaccinations in all countries [2].

The Ministry of Health in Saudi Arabia aims to improve travel medicine clinics—especially during the Hajj and Omrah [3]. Therefore, it established travel medicine clinics at King Khalid International Airport including consulting healthcare centers. Travelers could thus find qualified physicians to advise on their pre- and post-travel health issues [4].

Physicians are responsible for introducing preventive care regarding traveling including counseling travelers to get appropriate medical advice pre- and post-travel [3]. Therefore, there is a considerable need to train physicians to recognize travel-related illnesses and other adverse health issues [10]. Thus, assessing present knowledge, attitude, and practice (KAP) among physicians is important to determine knowledge gaps and improve the health of travelers and the community [11].

However, few studies have evaluated the KAP level of travel medicine among primary health care physicians in the Kingdom of Saudi Arabia. In addition, the available evidence showed a deficient level of knowledge and practice. This study aimed to assess the current

* Community Medicine Department, Faculty of Medicine
King Abdulaziz University, Jeddah, 21589, Saudi Arabia.
Email: sabdalal@kau.edu.sa

** Clinical Microbiology and Immunology Department
Faculty of Medicine, King Abdulaziz University, Jeddah, 21589, Saudi Arabia.

*** Medicine, King Abdulaziz University Faculty of Medicine, Jeddah, Saudi Arabia

**** Family Medicine Department, King Abdulaziz University Hospital
Jeddah, Saudi Arabia.

KAP level of travel medicine among physicians working at KAUH in Jeddah, Saudi Arabia.

METHODS

Study Design and setting:

We conducted a cross-sectional observational study among physicians working at KAUH in Jeddah, Saudi Arabia from May to October 2023.

Study subjects and data collection:

Physicians willing to participate in the study were included in the recruitment process and included consultants, specialists, residents, and interns. The physicians who refused to participate in the study were excluded. A validated self-administered questionnaire was distributed to the respondents in KAUH [11]. The questionnaire consists of two sections. The first section covered demographic information such as age, nationality, gender, work experience, department, education, and position. The second section covered questions related to travel health and medicine-related KAP questions

Statistical methods:

Data were extracted into an Excel sheet and revised. Statistical analysis was conducted using SPSS software (version 26.0, IBM, Armonk, NY, USA). Categorical variables were described in numbers and percentages. A normality test was performed for continuous variables. Continuous variables were reported as mean and standard deviation, median and interquartile range (IQR), and minimum and maximum. The student's t-test and one-way ANOVA (followed by a post-hoc test for statistically significant results) were used to compare the normally distributed numerical variables (knowledge score) with participants' characteristics. The Mann-Whitney and Kruskal-Wallis tests were used to compare the non-normally distributed numerical variables (attitude and practice score) with participants' characteristics. P-values less than 0.05 were considered statistically significant.

RESULTS

The study included 103 physicians aged 22 to 57 years with a mean (SD) age of 28.98 (6.66) and mean (SD) years of experience of 4.12 (5.23) years. Most were males (69.9%) and Saudis (96.1%) with bachelor's degrees (57.7%) and were residents (72.8%). The physicians' characteristics are shown in Table 1.

Regarding knowledge questions (Table 2), the results showed that only a small percentage of participants had a good understanding of different topics related to travel medicine. For instance, 27.2% of the respondents were aware of the existence of travel medicine, while 35% knew about the mortality and morbidity associated with travel. In addition, only 18.4% knew about the region-wise prevalence of infectious diseases to provide health advice to travelers, and 16.5% were familiar with the factors to be considered during pre-travel assessment. Similarly, 14.6% of the participants had confidence in predicting travel-related health risks based on the itinerary, and 22.3% knew about the pre-travel considerations for individuals with pre-existing cardiovascular diseases. Only 24.3% had knowledge of specific health issues related to prolonged air travel, and 32% knew about measures to avoid deep vein thrombosis from air travel. Additionally, 16.5% were aware of the guidelines for vaccination of travelers, and 25.2% were willing to prescribe vaccinations for individuals preparing for the Hajj pilgrimage. Moreover, only 19.4% were likely to advise on precautions to be taken to avoid health hazards associated with recreational water. Furthermore, only 19.4% had confidence in giving advice regarding practical food and water hygiene measures. Finally, only 17.5% could

identify travelers who are at risk of traveler's diarrhea, and 16.5% were likely to educate patients about behavior modification and prescribe antimicrobial pharmacological prophylaxis to prevent traveler's diarrhea. Full details are illustrated in Table 2.

Table 1. Demographic characteristics of the participants.

Age (Years) (N=102)	Mean (SD)	28.98 (6.66)	
	Median (IQR)	26 (7.25)	
	Min-Max	22-57	
Work of experience (Years) (N=102)	Mean (SD)	4.12 (5.23)	
	Median (IQR)	2 (4)	
	Min-Max	0-24	
Parameters	Category	N	Percentage
Gender (N=103)	Male	72	69.9
	Female	31	30.1
Nationality (N=103)	Saudi	99	96.1
	Egyptian	3	2.9
	Yemeni	1	1
Department (N=103)	Family Medicine	15	14.6
	Internal Medicine	15	14.6
	Pediatrics	14	13.6
	Surgery	14	13.6
	Intern	11	10.7
	Emergency Medicine	9	8.7
	Preventive Medicine	6	5.8
	Obstetrics and Gynecology	5	4.9
	Psychiatry	5	4.9
	Dentist	2	1.9
	Orthopedics	2	1.9
	Radiology	2	1.9
	Urology	2	1.9
Education (N=103)	Other	1	1
	Bachelors	78	75.7
	Master's degree	12	11.7
	Ph.D. or Board certification	13	12.6
	Resident/Intern	75	72.8
Position (N=103)	Specialist/ senior registrar	16	15.5
	Consultant	11	10.7
	Other	1	1.0

SD: Standard Deviation

IQR: Interquartile range

N: Number

Regarding attitude, 26.2% strongly agreed with the responsibility of a practicing physician to provide information on travel medicine to a traveler, and 21.4% strongly agreed that the basic knowledge of travel medicine is a part of the competence of a practicing physician in the modern world scenario. Another 13.6% strongly agreed that the body of knowledge of travel medicine differs from general medicine, infectious disease, and tropical medicine. Only 27.2% were strongly interested in participating in a short course on travel medicine. Approximately 34% of the participants strongly agreed that the knowledge of vector-borne disease prevention and malaria chemoprophylaxis is important for a practicing physician, and 37.9% strongly agreed that knowledge of the risk of travelers' diarrhea and its prophylaxis is important for a practicing physician. All responses are described in Table 3.

Table 2. Frequency of physicians' response to travel medicine knowledge questions (N=103).

Questions	N (%)				
	Not aware at all	Slightly aware	Aware	Well aware	Very well aware
Knowledge					
Are you aware that there is mortality and morbidity specifically associated with travel?	8 (7.8)	10 (9.7)	30 (29.1)	19 (18.4)	36 (35)
Are you aware of the existence of a branch of medicine called travel medicine?	22 (21.4)	25 (24.3)	14 (13.6)	14 (13.6)	28 (27.2)
Are you aware of the region-wide prevalence of infectious disease so that you can give travel-related health advice (regarding infection prevention) to a person visiting your country?	12 (11.7)	22 (21.4)	29 (28.2)	21 (20.4)	19 (18.4)
Are you aware of the factors to be considered in a pre-travel assessment?	13 (12.6)	16 (15.5)	35 (34)	22 (21.4)	17 (16.5)
How confident are you in foreseeing travel-related health risks from the itinerary?	11 (10.7)	26 (25.2)	26 (25.2)	15 (24.3)	15 (14.6)
Are you aware of the pre-travel considerations in the case of travelers with pre-existing cardiovascular disease?	16 (15.5)	11 (10.7)	33 (32)	20 (19.4)	23 (22.3)
Are you aware of the specific health-related issues that can arise as a result of prolonged air travel?	15 (14.6)	13 (12.6)	26 (25.2)	24 (23.3)	25 (24.3)
Are you aware of the measures to avoid the development of deep vein thrombosis due to air travel?	7 (6.8)	11 (10.7)	28 (27.2)	24 (23.3)	33 (32)
Are you aware of the practical advice that can be given to a traveler before air travel?	12 (11.7)	10 (9.7)	35 (34)	23 (22.3)	23 (22.3)
Are you aware of the additional health risks during travel by sea?	18 (17.5)	22 (21.4)	29 (28.2)	19 (18.4)	25 (14.6)
Are you aware of the guidelines for vaccination of travelers?	9 (8.7)	21 (20.4)	32 (31.1)	24 (23.3)	17 (16.5)
Are you aware of the contraindications for travel to high altitude?	17 (16.5)	15 (14.6)	35 (34)	24 (23.3)	12 (11.7)
Are you aware of the health risks associated with hot climate?	14 (13.6)	20 (19.4)	35 (34)	22 (21.4)	12 (11.7)
Are you aware of the issues to be addressed when your patient is planning for deep sea diving?	21 (20.4)	19 (18.4)	33 (32)	14 (13.6)	16 (15.5)
Are you aware of the specific considerations before wilderness travel?	21 (20.4)	28 (27.2)	28 (27.2)	16 (15.5)	10 (9.7)
Are you aware of the specific health-related challenges associated with mass gatherings?	13 (12.6)	9 (8.7)	34 (33)	26 (25.2)	21 (20.4)
Will you be able to prescribe vaccinations for a traveler preparing for the Hajj pilgrimage?	8 (7.8)	14 (13.6)	32 (31.1)	23 (22.3)	26 (25.2)
Are you familiar with the post- and pre-exposure prophylaxis against rabies?	7 (6.8)	15 (14.6)	32 (31.1)	21 (20.4)	28 (27.2)
Will you be able to advise you on the precautions to be taken to avoid health hazards associated with recreational water to your patient?	9 (8.7)	25 (24.3)	30 (29.1)	19 (18.4)	20 (19.4)
Will you be able to explain the situations where one should avoid swimming?	13 (12.6)	15 (14.6)	33 (32)	27 (26.2)	15 (14.6)
Are you confident enough to give advice regarding the practical measures for food and water hygiene?	9 (8.7)	13 (12.6)	38 (36.9)	23 (22.3)	20 (19.4)
Are you aware of the recommendations regarding practicing sexual activity (safe sexual practices) before, during, and after travel?	15 (14.6)	16 (15.5)	34 (33)	20 (19.4)	18 (17.5)
Are you aware of the contraindications and adverse effects of common antimalarial drugs?	23 (22.3)	15 (14.6)	31 (30.1)	22 (21.4)	12 (11.7)
Do you know the definition of traveler's diarrhea?	8 (7.8)	13 (12.6)	27 (26.2)	27 (26.2)	28 (27.2)
Will you be able to identify travelers who are at risk of traveler's diarrhea?	14 (13.6)	17 (16.5)	28 (27.2)	26 (25.2)	18 (17.5)
Will you be able to educate a patient regarding behavior modification for preventing traveler's diarrhea?	13 (12.6)	13 (12.6)	37 (35.9)	23 (22.3)	17 (16.5)
Will you be able to prescribe anti-microbial pharmacological prophylaxis against traveler's diarrhea?	16 (15.5)	15 (14.6)	28 (27.2)	27 (26.2)	17 (16.5)

Are you aware of the common mental disorders associated with travel?	20 (19.4)	20 (19.4)	31 (30.1)	20 (19.4)	12 (11.7)
Are you aware of the equipment and supplies required for starting a travel clinic?	28 (27.2)	19 (18.4)	34 (33)	15 (14.6)	7 (6.8)
Are you aware of the information resources required for a clinician required for conduct a travel clinic?	21 (20.4)	20 (19.4)	36 (35)	14 (13.6)	12 (11.7)
Are you aware of the information to be included in an immunization record?	15 (14.6)	20 (19.4)	32 (31.1)	24 (23.3)	12 (11.7)
Will you be able to formulate a differential diagnosis based on the symptoms with which a patient presents to you after traveling to a particular location?	8 (7.8)	24 (23.3)	33 (32)	24 (23.3)	14 (13.6)
N: Number %: Percentage					

Table 3. Frequency of physicians' response to travel medicine attitude questions (N=103)

Questions	N (%)				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Attitude					
It is the responsibility of a practicing physician to provide information on travel medicine to a traveler	3 (2.9)	19 (18.4)	33 (32)	21 (20.4)	27 (26.2)
The basic knowledge of travel medicine is a part of the competence of a modern practicing physician	4 (3.9)	11 (10.7)	37 (35.9)	29 (28.2)	22 (21.4)
The body of knowledge of travel medicine differs from general medicine, infectious disease, and tropical medicine	9 (8.7)	9 (8.7)	38 (36.9)	33 (32)	14 (13.6)
Are you interested in participating in a short course on travel medicine at your health center?	7 (6.8)	16 (15.5)	26 (25.2)	26 (25.2)	28 (27.2)
Knowledge of travel vaccines is important for a practicing physician	3 (2.9)	7 (6.8)	30 (29.1)	28 (27.2)	35 (34)
Knowledge of health issues related to scuba diving is important for a practicing physician	7 (6.8)	7 (6.8)	36 (35)	24 (23.3)	29 (28.2)
Knowledge of vector-borne disease prevention and malaria chemoprophylaxis is important for a practicing physician	5 (4.9)	14 (13.6)	26 (25.2)	23 (22.3)	35 (34)
Knowledge of the risk of travelers' diarrhea and its prophylaxis is important for a practicing physician	6 (5.8)	10 (9.7)	24 (23.3)	24 (23.3)	39 (37.9)
Addressing mental health issues post-travel is important in post-travel consultation	4 (3.9)	12 (11.7)	20 (19.4)	29 (28.2)	38 (36.9)
N: Number %: Percentage					

Table 4: Frequency of physicians' response to travel medicine practice questions (N=103).

Questions	N (%)				
	Never	Rarely	Sometimes	Always	Often
Practice					
How often have you done a pre-travel assessment of a traveler before travel in the last two years?	37 (35.9)	20 (19.4)	30 (29.1)	10 (9.7)	6 (5.8)
How often have you advised travel vaccines in the last two years?	33 (32)	22 (21.4)	23 (22.3)	19 (18.4)	6 (5.8)
How often have you given health advice to a person planning for scuba diving in the last two years?	39 (37.9)	14 (13.6)	27 (26.2)	15 (14.6)	8 (7.8)
How often have you given pre-travel advice to a person planning to attend a mass gathering in the last two years?	28 (27.2)	12 (11.7)	33 (32)	16 (15.5)	14 (13.6)
How often have you advised malaria chemoprophylaxis to a person planning to travel to a malaria-endemic region in the last two years?	33 (32)	16 (15.5)	29 (28.2)	16 (15.5)	9 (8.7)
How often have you advised prophylaxis for travelers' diarrhea in the last two years?	30 (29.1)	15 (14.6)	33 (32)	12 (11.7)	13 (12.6)
N: Number %: Percentage					

Regarding the practice of travel medicine in the last two years, only 5.8% reported that they had often done a pre-travel assessment of a traveler before travel and advised travel vaccines. Some physicians (13.6%) reported that they had often given pre-travel advice to a person planning to attend a mass gathering, 8.7% reported that they had often advised malaria chemoprophylaxis to a person planning to travel to a malaria endemic region, and 12.6% reported that they had often advised prophylaxis for travelers' diarrhea. All details are in Table 4.

The total scores of the KAP regarding travel medicines among the participants are described in Table 5. The total knowledge score ranged from 43 to 160 out of 215, with a mean (SD) of 100.12 (26.32). The total score of the attitude ranged from 9 to 45 out of 45, with a mean (SD) of 32.53 (7.88). The total score of the practice ranged from 6 to 30 out of 30 with a mean (SD) of 15.10 (6.72).

Age, educational level, position, and years of experience were significantly associated with knowledge scores (Table 6). Older participants (more than 25 years) had a higher mean knowledge score than those aged less than or equal to 25 years (105.31 vs. 92.57, respectively, $p=0.015$). After applying the post-hoc test, we found that participants with a master's degree or a Ph.D. or board certification had higher knowledge scores than those with a bachelor's degree with a significant mean difference of 23.28 and 33.17, respectively ($p<0.001$). Additionally, participants with a position of consultant and other positions had higher mean knowledge scores than those who were a resident/intern and specialist/senior registrar (120.36 and 126 vs 94.27 and 112, respectively, $p=0.002$). Moreover, the participants with more than five years of experience had higher mean knowledge scores than those with less than or equal to five years of experience (116.76 vs 94.78, respectively, $p=0.004$).

Table 5. Total scores of the participants' answers regarding knowledge, attitude, and practice regarding travel medicines

The total score of the knowledge regarding travel medicines.	Mean (SD)	100.12 (26.32)
	Median (IQR)	98 (29)
	Min-Max	43 – 160
The total score of the attitude regarding travel medicines.	Mean (SD)	32.53 (7.88)
	Median (IQR)	32 (12)
	Min-Max	9 – 45
The total score of the practice regarding travel medicines.	Mean (SD)	15.10 (6.72)
	Median (IQR)	16 (10)
	Min-Max	6 – 30

Table 6. Association between the individuals' characteristics and knowledge scores regarding travel medicines

Factors		Mean (SD)	P-value
Knowledge			
Age	≤25 years	92.57 (23.82)	0.015
	>25 years	105.31 (26.88)	
Gender	Male	100.68 (23.10)	0.775
	Female	98.81 (33.01)	
Nationality	Saudi	100.02 (26.65)	0.813
	Non-Saudi	102.50 (18.70)	
Educational level	Bachelors	93.22 (21.76)	<0.001
	Master's degree	116.50 (13.81)	
	Ph.D. or board certification	126.38 (36.75)	
Position	Consultant	120.36 (39.15)	0.002
	Resident/Intern	94.27 (21.81)	
	Specialist/ senior registrar	112.00 (25.97)	
	Other	126.00 (-)	
Years of experience	≤5 years	94.78 (21.22)	0.004
	> 5 years	116.76 (33.44)	
Department	Dentist	100.00 (4.24)	0.062
	Emergency Medicine	121.00 (21.99)	
	Family Medicine	102.67 (32.87)	
	Intern	78.64 (21.83)	
	Internal Medicine	99.40 (18.90)	
	Obstetrics and Gynecology	91.60 (2.88)	
	Orthopedics	84.50 (45.96)	
	Pediatrics	98.07 (17.86)	
	Preventive Medicine	116.00 (32.42)	
	Psychiatry	84.40 (22.03)	
	Radiology	92.50 (30.40)	
	Surgery	104.43 (30.46)	
	Urology	118.00 (31.11)	
	Other	126.00 (-)	

SD: standard deviation

Gender, educational level, and department were significantly associated with the attitude scores. Female participants had a higher mean attitude scores (34.93) than male participants (31.50) (p=0.023). In addition, participants with bachelor's degrees had lower attitude scores than participants with master's degrees and Ph.D. or board certifications (31.27 vs 35.58 and 37.31, respectively, p=0.011). Participants working in preventive medicine departments showed the highest mean attitude scores (p=0.045). All details are described in Table 7.

Table 7. Association between the individuals' characteristics and attitude scores regarding travel medicines

Factors		Mean (SD)	P-value
Attitude			
Age	≤25 years	32.76 (7.89)	0.788
	>25 years	32.38 (7.93)	
Gender	Male	31.50 (6.88)	0.023
	Female	34.93 (9.52)	
Nationality	Saudi	32.41 (7.93)	0.369
	Non-Saudi	35.50 (6.81)	
Educational level	Bachelors	31.27 (7.72)	0.011
	Master's degree	35.58 (5.76)	
	Ph.D. or Board certification	37.31 (8.40)	
Position	Consultant	36.45 (8.81)	0.263
	Resident/Intern	31.91 (7.45)	
	Specialist/ senior registrar	32.50 (9.05)	
	Other	37.00 (-)	
Years of experience	≤5 years	32.22 (7.49)	0.373
	> 5 years	33.52 (9.08)	
Department	Dentist	25.00 (1.41)	0.045
	Emergency Medicine	36.56 (6.77)	
	Family Medicine	34.33 (8.92)	
	Intern	33.27 (9.34)	
	Internal Medicine	30.07 (5.76)	
	Obstetrics and Gynecology	25.40 (2.19)	
	Orthopedics	30.50 (4.95)	
	Pediatrics	32.86 (6.62)	
	Preventive Medicine	39.50 (5.43)	
	Psychiatry	28.20 (5.45)	
	Radiology	34.50 (10.60)	
Surgery	31.00 (9.89)		
Urology	37.00 (9.90)		
Other	37.00 (-)		

SD: standard deviation

Assessment of the factors correlated to practice scores showed that the educational level and the department were significantly associated with practice scores. Participants with bachelor's degrees had lower practice scores than participants with master's degrees and Ph.D. or board certifications (14.23 vs 17.67 and 17.92, respectively, p=0.011). Participants working in the preventive medicine departments had the highest mean practice scores (p=0.016).

Table 8. Association between the individuals' characteristics and practice scores regarding travel medicines

Factors		Mean (SD)	P-value
Practice			
Age	≤25 years	13.93 (6.91)	0.124
	>25 years	15.90 (6.52)	
Gender	Male	15.53 (6.29)	0.206
	Female	14.06 (7.62)	
Nationality	Saudi	15.30 (6.72)	0.138
	Non-Saudi	10.00 (4.97)	
Educational level	Bachelors	14.23 (6.00)	0.011
	Master's degree	17.67 (6.05)	
	Ph.D. or Board certification	17.92 (9.08)	
Position	Consultant	18.82 (8.68)	0.098
	Resident/Intern	14.19 (6.09)	
	Specialist/ senior registrar	16.06 (7.24)	
	Other	24.00 (-)	
Years of experience	≤5 years	14.35 (6.17)	0.063
	> 5 years	17.44 (7.88)	
Department	Dentist	15.50 (2.12)	0.016
	Emergency Medicine	20.89 (3.55)	
	Family Medicine	15.87 (6.91)	
	Intern	9.09 (4.93)	
	Internal Medicine	13.80 (4.35)	
	Obstetrics and Gynecology	16.80 (1.09)	
	Orthopedics	13.50 (10.61)	
	Pediatrics	13.50 (6.86)	
	Preventive Medicine	15.00 (8.72)	
	Psychiatry	13.40 (6.77)	
	Radiology	7.50 (2.12)	
Surgery	18.43 (7.79)		
Urology	18.50 (7.78)		
Other	24.00 (-)		

SD: standard deviation

DISCUSSION

Travel medicine is a type of preventive care that focuses on preparing travelers for health issues that they may encounter before and after their travels. Travelers should consult with physicians to ensure they are prepared for any potential health problems that may arise during their travels [2]. Therefore, our study aimed to assess the level of KAP of travel medicine among physicians in KAU Hospital.

Travel medicine includes comprehensive knowledge of global epidemiology concerning infectious and noninfectious health risks and up-to-date familiarity with health regulations, immunization requirements, and the evolving nature of drug-resistant infections in different countries [12]. In our study, less than half of the participants (40.8%) were aware of the existence of a branch of medicine called travel medicine.

The most common travel-related illnesses are gastrointestinal, respiratory, dermatologic, and systemic febrile syndromes [13]. Other diseases include infectious diseases related to consuming contaminated food and water such as brucellosis, listeriosis, cholera, leptospirosis, typhoid fever, and hepatitis A and E [14]. We found that only one-third of the participants (38.8%) were aware of the region-wide prevalence of infectious disease. On the other hand, nearly 40% of the participants felt confident giving advice on practical measures for food and water hygiene.

The study revealed an unsatisfactory level of knowledge and practice with a positive attitude toward travel medicine among physicians. However, those aged over 25 years, had completed post-graduate studies (master's degree, Ph.D., or Board certification), or were consultants had significantly more knowledge. Females, participants with post-graduate qualifications, and those in the preventive medicine department had significantly higher attitude levels. Additionally, participants with post-graduate qualifications and those in the preventive medicine department had significantly higher practice levels.

Several studies are consistent with our results. A study conducted in Riyadh reported a suboptimal KAP level of travel medicine among primary healthcare physicians [3]. Moreover, a Malaysia study [15] reported a gap in the knowledge and practice level with positive attitudes toward travel medicine among community pharmacists. A study conducted in Turkey [16] reported insufficient knowledge and attitude levels among medical doctors toward travel medicine. An interventional study in Saudi Arabia [17] reported that physicians' knowledge of travel medicine was sufficient after implementing an interventional program in Saudi Arabia. Similarly, a study conducted in Qatar [18] reported that physicians' knowledge and practices improved after the symposium. Therefore, these findings highlight the importance of organizing services with high-quality training, support materials, and continuous professional development.

Vaccines for travelers can be classified into three categories: routine, required, and recommended [19]. In our study, 34% strongly agreed that knowledge of travel vaccines is important for a practicing physician, and 5.8% had only done a pre-travel assessment of a traveler before travel and advised travel vaccines. Regarding malaria chemoprophylaxis, 34% strongly agreed that the knowledge of vector-borne disease prevention and malaria chemoprophylaxis is important for a practicing physician, and 8.7% reported that they had often advised malaria chemoprophylaxis to a person planning to travel to a malaria-endemic region. However, a study in the UK [20] reported that 77.0% and 65.0% of respondents correctly identified the recommendations for vaccines and malaria medications, respectively. Another study conducted in Malaysia [15] reported that around half of PCPs correctly identified vaccine recommendations for Kenya and Thailand. Additionally, about two-thirds of PCPs identified malaria chemoprophylaxis recommendations for Thailand.

The education level is a significant factor for KAP levels in travel medicine. The number of years of experience also affected the knowledge level. A Turkish study [16] reported a significant difference between the awareness and attitudes toward travel medicine and educational level. It indicated increased awareness with increased work experience. The preventive medicine department participants also showed a significantly higher attitude and practice level. There was a gap in the literature review regarding the association between KAP level and participants' characteristics.

There are some limitations to our study. The study was conducted at a single hospital, which may limit the generalizability of the findings

to other healthcare settings. Furthermore, the study included a relatively small sample size of only physicians with no consideration of other healthcare providers. Future studies with larger sample sizes and diverse healthcare populations are needed to better understand physicians' knowledge, attitude, and practice levels in travel medicine.

CONCLUSION

Our study reveals a suboptimal level of knowledge and practice, with a positive attitude towards travel medicine among physicians at KAU Hospital. These findings highlight the need to integrate travel medicine as a formal medical education and training program component. This should include dedicated courses, workshops, and practical training on travel-related diseases, global epidemiology, health regulations, immunization requirements, and drug-resistant infections. Awareness campaigns are crucial to increase the understanding and recognition of travel medicine among healthcare professionals.

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Ethical approval

Ethical approval was obtained from the research ethical committee of the unit of biomedical ethics (reference number: 255-22). Verbal consent was obtained from the participants, and confidentiality was maintained throughout all research steps.

Authors' contributions

SAA was involved in conceiving and designing the study, conducting research, analyzing and interpreting data, and writing the final manuscript. HAN was involved in conceiving and designing the study, analyzing and interpreting data, and writing the final manuscript. MAA was involved in conceiving and designing the study, and writing the final manuscript. ASO was involved in collecting and organizing data, as well as writing the final manuscript. SEI was involved in conceiving and designing the study, and writing the final manuscript. NRA was involved in collecting and organizing data, and writing the final manuscript. MKA was involved in collecting and organizing data, and writing the final manuscript. SAA was involved in collecting and organizing data, and writing the final manuscript. All authors have read and approved the manuscript.

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