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ORIGINAL ARTICLE

Knowledge, attitudes, and practices regarding travel health among Muscat International Airport travelers in Oman: Identifying the gaps and addressing the challenges



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Abstract Although the majority of travel-associated communicable diseases can be prevented, the public health burden of these diseases remains significant. Relatively little is known about how travelers know and perceive the health risks associated with travel and how they utilize preventive measures before and while traveling abroad. This study was conducted to determine the level of the knowledge, attitudes, and practices (KAP) of Muscat International Airport travelers about travel health in order to assess the knowledge gap and the need for travel health services in Oman. A cross-sectional study was conducted over a period of 1 week using a self-administered questionnaire. The overall level of knowledge about vaccine-preventable diseases, food safety, and preventive measures against insect bites of the participants was inadequate. The practice concerning preventive travel health measures, such as the use of specific immunizations and antimalarial prophylaxis, was very limited, and influenced by some personal and travel-related factors. The inadequate level of travelers' knowledge and poor utilization of travel medicine ser-

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vices highlights the need for the provisions of specialized travel medicine services at the national level and to develop educational materials promoting the importance of pre-travel health advice.

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1. Introduction

International traveling for various purposes has increased significantly. It exposes individuals to new cultural, psychological, physiological, and microbiological experiences [1]. The risk of a traveler for contracting a travel-related infectious disease does not only depend on the destination of travel, length of the trip, and planned activities, but also on the traveler's personal risk profile [2]. Travelers' abilities to adapt, cope, and survive are influenced by many variables such as personality and experience, which differ according to age, gender, culture, social, education, and health [3].

One of the main determinants of the traveler's personal risk profile is usually presented as the knowledge, attitudes, and practices (KAP) of a traveler toward the prevention of travel-related infectious disease. In KAP studies, knowledge is usually defined as an accurate risk perception, whereas attitude is commonly defined as either intended risk-seeking or risk-avoiding behavior. Finally, practice is defined as the rate of protection against a certain travel-related infectious disease [2].

Although most travel-associated diseases can be prevented through vaccination, medications, and pre-travel consultation, several surveys have demonstrated that a high proportion of travelers are unaware of travel health risks. In many cases, travelers have not received the immunizations, medications for prophylaxis, or standby treatment usually recommended in their respective countries of origin, despite the range of opportunities for travel health advice available [4–7]. Therefore, the public health burden of these diseases remains significant and travelers are still contracting diseases during international travel [8].

Moreover, returning from abroad with an infectious disease might affect relatives, people with close contacts, or the larger community. Applying prophylactic travel health measures benefits individuals and the public health as well.

This is the first study to be conducted in Oman considering KAP of the public about some travel health-related aspects. With the aim of determining the level of the KAP of Muscat International

Airport travelers about travel health, it may help in assessing the knowledge gap and the needs of travel health services in Oman.

2. Materials and methods

This is a cross-sectional study looking at travel health KAP of travelers. It was conducted in Muscat International Airport and included samples collected within 1 week from January 18, 2015 to January 25, 2015; the data were collected throughout the daytime to include as many as possible travelers to all destinations. Of the 250 travelers asked to participate, 219 participated (response rate of 87.6%); after exclusion of the questionnaires with missing data, the final number included in the study was 204.

A four page, self-administered, anonymous questionnaire was used for this study in order to measure the KAP regarding travel health. This questionnaire was developed and used in a previous study for the same purpose [8]. It consists of three main sections, including questions about some sociodemographic factors, travel preparedness, and travel health. The questionnaire takes less than 10 min to complete and it was prepared in Arabic and English to accommodate a participant's preference.

Questionnaires were administered by trained personnel from the port health staff to willing participants waiting to board an international flight at Muscat International Airport. Inclusion criteria for the participants was residence in Oman (Omanis or non-Omanis), aged ≥ 18 years, and that they were boarding an international flight.

A pilot study was conducted among 20 individuals in 1 day in order to check the time for filling, clarity of questions, and to train the investigators. Seventeen questions were used to assess an individual traveler's knowledge, and responses were ranked as excellent, good, or poor, as follows: $\geq 80\%$ excellent (≥ 14 correct answers), 60–80% as good (10–13 correct answers), and $<60\%$ as poor (<10 correct answers). Attitude toward travel health was classified as positive (those who are willing to adopt risk-avoiding behavior) or negative (those who are intending to adopt risk-seeking

behavior). Practice was assessed by asking about consulting for pre-travel advice, buying or administering preventive measures, and being under health insurance at the destination.

2.1. Statistical analysis

The analysis was conducted using SPSS version 10 (IBM, Armonk, NY, USA). Frequency distributions were used for basic descriptive statistics. Pearson's Chi-square tests were conducted for all cross-tabular data. When the expected cell count was < five, Fisher's exact test was used. A *p* value ≤ 0.05 was considered significant.

2.2. Ethical considerations

The study was conducted by the port health staff at the airport after getting approval from Oman Airports Management Company, Muscat, Oman. Survey participation was completely voluntary, and data were collected anonymously.

All participants gave written informed consent prior to their participation, and no incentives were given to them. Following the survey, no further contact will be made with the participants.

3. Results

Of the respondents, 114 (60%) were Omanis and 148 (72.5%) were males. The age of participants ranged between 18 years and 81 years, with a mean of 36.7 ± 12.6 years (Table 1). Regarding travel profile, 188 (92.2%) reported that they had traveled outside Oman prior to this trip. Forty-eight (24.7%) were traveling alone and only 64 (31.4%) were traveling to their destination for the first time. Travel destinations were almost equally distributed between Middle East countries and India, and the least frequent destination was Europe. A total of 96 (47.5%) participants were traveling to rural areas, and the most common sleeping arrangement was in hotels and resorts, followed by private homes.

Multiple reasons for travel were reported; the most common was tourism in 64 (31.4%) of the respondents, followed by business in 46 (22.5%), and the least reported reason for travel was education in six (2.9%) of the respondents. One hundred and six (52%) participants began the preparation for their travel at least 1 month prior to their travel date. One hundred and seventy (83.3%) of the participants reported seeking general information about their trip and their primary source was from family and friends (55.3%).

Table 1 Some demographic and travel related characters of the studied group.

Character	No. (%)
Nationality (Omani)	114 (55.9)
Age (y)	
• 18–34	110 (53.9)
• 35–60	82 (40.2)
• >60	12 (5.8)
Mean \pm SD	36.07 \pm 12.6
Sex (male)	148 (72.5)
1st time to visit destination	64 (31.4)
Length of stay < 1 wk	86 (42.1)
Purpose of travel	
• Business	46 (22.5)
• Tourism	64 (31.4)
• Visiting friend or relatives	36 (17.6)
• Education	6 (2.9)
• Religious	22 (10.8)
• Others	30 (14.7)
Travel destination	
• Europe	34 (17.0)
• Middle East	87 (42.0)
• Asia (India)	83 (41.0)
Traveling to rural area	96 (47.5)
Sleeping arrangement	
• Hotel/resort	122 (59.8)
• Dorm/youth hostel	4 (2.0)
• Camping	6 (2.9)
• Private home	54 (26.5)
• Others	18 (8.8)
Travel preparation time	
• ≥ 4 wk before	106 (52.0)
• 2–4 wk before	26 (12.7)
• 1–2 wk before	38 (18.6)
• During the wk of the travel	34 (16.7)
Seeking general information about travel destination	170 (83.3)
Source of information	
• Family	94 (55.3)
• Internet	60 (35.3)
• Travel agent	14 (8.2)
• Travel book	2 (1.2)

Knowledge of the travelers is shown in Table 2. The most commonly recognized vaccine-preventable travel-associated communicable disease in 114 (55.9%) of the travelers surveyed was hepatitis A, followed by typhoid fever in 104 (51%), and the least recognized was rabies in 36 (17.6%). Regarding food items that can commonly cause infections while traveling, food from street vendors was the most frequently identified as a harmful item (64.6%), while milk and milk products (21.6%) and ice cubes (25.5%) were the least likely to be identified correctly as potentially harmful.

Table 2 Knowledge, attitude, and behavior of studied group about travel-associated communicable diseases.

Knowledge, attitude, and behavior	No. (%)
Vaccine-preventable travel-associated communicable diseases ^a	
• Hepatitis A	114 (55.9)
• Hepatitis B	84 (41.2)
• Measles	74 (36.3)
• Typhoid	104 (51)
• Poliomyelitis	76 (37.3)
• Yellow fever	56 (27.5)
• Rabies	36 (17.6)
Food items that can cause infections if consumed outside the country ^a	
• Ice creams	62 (30.4)
• Food from street vendors	132 (64.6)
• Tap water	90 (44.1)
• Ice cubes	52 (25.5)
• Milk & milk products	44 (21.6)
• Sushi/shellfish	54 (26.5)
• Raw fruit or vegetable	62 (30.4)
Recommended preventive measure against insects bite ^a	
• Insect repellents	74 (36.2)
• Arms & legs cover	62 (30.4)
• Use of mosquito net & screens	86 (42.1)
Positive attitude toward travel health	124 (60.8)
Pre-travel health advice	46 (22.5)
Time of advice ^b	
• ≥4 wk before	16 (34.8)
• 2–4 wk before	8 (17.4)
• 1–2 wk before	12 (26.1)
• During the wk of the travel	10 (21.7)
Source of health advice ^b	
• Governmental health facility	8 (17.4)
• Private health facility	16 (34.8)
• Internet	18 (39.1)
• Literature review	4 (8.7)
Pre-travel preventive measures	14 (6.9)
Preventive measures ^c	
• Vaccine	8 (57.1)
• Antimalarial	4 (28.6)
• Over the counter medications	2 (14.3)
Health insurance	78 (38.2)

^a Categories are not mutually exclusive.

^b Among travelers with pre-travel advice only.

^c Among travelers with preventive measures only.

In relation to knowledge about preventive measures against insects bites, the use of mosquito nets and screens was the most frequent answer, by 86(42%) participants, and only 62 (30.4%) of the participants labeled covering arms and legs as a preventive measure.

The knowledge of 29 (14.2%) of the participants was ranked as excellent, 129 (63.2%) ranked as good, and only 46 (22.5%) ranked as poor.

Positive attitude toward travel medicine was detected in 124 (60.8%) participants and of these, only 46 (37.1%) actually obtained pre-travel advice. The reported barriers among those who were willing to adopt risk-avoiding behavior but the actual practice of getting pre-travel consultation were either “No time to get it” by 32 (41%) participants or “Didn’t know where to get it” by 46 (59%); no one reported financial obstacles. By

Table 3 Distribution of knowledge score among studied

	Excellent ($\geq 80\%$) No. (%)	Good (60–80%) No. (%)	Poor (<60%) No. (%)	Significance
Nationality				
• Omani	17 (58.6)	75 (58.1)	22 (47.8)	$\chi^2 = 1.5, p = 0.4$
• Non-Omani	12 (41.4)	54 (41.9)	24 (52.2)	
Age (y)				
• 18–34	18 (62.1)	71 (55.0)	21 (45.6)	$\chi^2 = 4.8, p = 0.3$
• 35–60	8 (27.6)	52 (40.3)	22 (47.8)	
• >60	3 (10.3)	6 (4.7)	3 (6.5)	
Sex				
• Male	15 (51.7)	103 (79.8)	30 (65.2)	$\chi^2 = 11.13, p < 0.001$
• Female	14 (48.3)	26 (20.2)	16 (34.8)	
Travel destination				
• Europe	7 (24.1)	24 (18.6)	3 (6.5)	$\chi^2 = 89.1, p < 0.001$
• Middle East	19 (65.5)	65 (50.4)	3 (6.5)	
• Asia (India)	3 (10.3)	40 (31.0)	40 (87.0)	
Purpose of travel				
• Business	4 (13.8)	25 (19.4)	17 (37.0)	$\chi^2 = 13.8, p = 0.17$
• Tourism	11 (37.9)	42 (32.6)	11 (23.9)	
• Visiting	4 (13.8)	27 (20.9)	5 (10.9)	
• Education	0	5 (3.9)	1 (2.2)	
• Religious	6 (20.7)	11 (8.5)	5 (10.9)	
• Others	4 (13.8)	19 (14.7)	7 (15.2)	
Total	29 (14.2)	129 (63.2)	46 (22.5)	

contrast, negative attitude was reported by 80 (39.2%) of the participants and the stated reasons for these negative attitudes were either “I am not interested in health” by 20 (25%) or “it is not important as I am in good health” by 60 (75%) participants (Table 2).

Only 46 (22.5%) reported obtaining pre-travel health advice; the primary source was the Internet for 18 (39.1%), and the least accessed source was the literature review, and in 34.8% of them, obtaining health advice was 4 weeks or earlier prior to the departure date. Fourteen (30.4%) reported receiving or buying medicine or vaccinations specifically for this trip. Eight (57%) of the fourteen received pre-travel vaccination. Only 78 (38.2%) of the participants had health insurance at their destinations (Table 2).

Males had higher knowledge levels than females; among those with good knowledge, 103 (79.8%) of them were males and among those with poor knowledge, 30 (65.2%) of them were females, with a statistically significant difference between the groups ($p < 0.001$). Travelers to countries in the Middle East showed a higher level of knowledge and were among those with excellent knowledge and those with good knowledge 19 (65.5%) and 65

(50.4%), respectively; and 40 (87.0%) of the travelers with poor knowledge were going to India with statistical significance between the groups ($p < 0.001$; Table 3).

Table 4 shows the analysis of the association between attitudes and some factors related to attitude. The only significant factor was the destination of travel. Among those with a positive attitude, 76 (61.3%) were going to the Middle East and among those with negative attitude, 59 (73.8%) were going to India, with a statistically significant difference between the groups ($p < 0.001$).

Among travelers who reported pre-travel consultation, participants aged between 18 years and 35 years were the most likely [30(65.2%)] to seek travel health advice prior to the trip, with a significant difference between the utilization of pre-travel health advice across age groups ($p = 0.05$). Among those who reported buying or applying preventive measures prior to the trip, eight (57.1%) were female. The most common purpose for travel among travelers who applied preventive measures was religious (57.1%), followed by equal distribution of other purposes like tourism, business, and visiting friends or family, with a statistically significant difference between groups ($p < 0.001$). Being

Table 4 Attitude of the studied group in relation to some factors.

	Positive attitude No. (%)	Negative attitude No. (%)	Significance
Nationality			
• Omani	70 (56.5)	44 (55)	$\chi^2 = 0.04, p = 0.8$
• Non-Omani	54 (43.5)	36 (45)	
Age (y)			
• 18–34	69 (55.6)	41 (51.2)	$\chi^2 = 0.9, p = 0.6$
• 35–60	47 (37.9)	35 (43.7)	
• >60	8 (6.5)	4 (5.0)	
Sex			
• Male	86 (69.4)	62 (77.5)	$\chi^2 = 1.6, p = 0.2$
• Female	38 (30.6)	18 (22.5)	
Travel destination			
• Europe	24 (19.4)	10 (12.5)	$\chi^2 = 65.5, p < 0.001$
• Middle East	76 (61.3)	11 (13.7)	
• Asia (India)	24 (19.3)	59 (73.8)	
Purpose of travel			
• Business	27 (21.8)	19 (23.8)	$\chi^2 = 2.2, p = 0.8$
• Tourism	40 (32.3)	24 (30.0)	
• Visiting	22 (17.7)	14 (17.6)	
• Education	2 (1.6)	4 (5.0)	
• Religious	14 (11.3)	8 (10.0)	
• Others	19 (15.3)	11 (13.8)	
Total	124 (60.8)	80 (39.2)	204

health insured at the destination was also analyzed and found to be significantly associated with nationality, as most of the insured were non-Omani, and this was also associated with the purpose of travel (Table 5).

4. Discussion

The questionnaire used in this study was distributed to a sample of international travelers at the departure lounge in Muscat International Airport with a response rate of 87.6%. This response rate is considered higher than that reported by other studies [9–13], but lower than the study conducted among Korean travelers going to India which reached 94% [14].

Age and sex distribution in this study are similar to other studies conducted in the neighboring Gulf countries [13,15,16]. By contrast, respondents from Western countries tend to be nearly equally divided into men and women [16–19] and come from a slightly older group [2,20]. This difference in age and sex distribution, keeping in consideration that almost half of the respondents were non-Omani, highlights the nature of a large sector of respondents in our study as the workforce who were going to their home countries.

Tourism, business, and visiting family and friends were the three most common purposes of travel in this study group, which is similar to other studies [2,15,19]. The Middle East and Asia, specifically India, were the destinations of the majority of participants in this study and this is similar to other studies conducted in other Gulf countries [15,16].

Although the majority of the study group were experienced travelers, got general information about their destinations, and more than half of them prepared for their trip at least 1 month in advance, the overall level of knowledge about vaccine-preventable diseases, food safety, and preventive measures against insect bites was inadequate. Rather, the practice concerning preventive travel health measures, especially the use of specific immunizations and antimalarial prophylaxis, was very limited.

Risk perception is very important for self-protection against many diseases associated with travel [21]. About one fifth of our respondents had poor knowledge scores regarding the risk of travel-associated communicable diseases and methods of preventions. In addition, 75% of travelers with a negative attitude toward travel medicine denied their need to any preventive measures. This

Table 5 Distribution of travel related health practice among studied group and some factors.

	Pre-travel advice		Preventive measures		Health insurance	
	Yes	No	Yes	No	Yes	No
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Nationality						
• Omani	26 (56.5)	88 (55.7)	10 (71.4)	104 (54.7)	16 (20.5)	98 (77.8)
• Non-Omani	20 (43.5)	70 (44.3)	4 (28.6)	86 (45.3)	62 (79.5)	28 (27.2)
Significance	$\chi^2 = 0.01, p = 0.9$		$\chi^2 = 1.4, p = 0.2$		$\chi^2 = 64.1, p < 0.001$	
Age (y)						
• 18–34	30 (65.2)	80 (50.6)	10 (71.4)	100 (52.6)	38 (48.7)	72 (57.1)
• 35–60	12 (30.4)	70 (44.3)	4 (28.6)	78 (41.1)	34 (43.6)	48 (38.1)
• >60	4 (8.7)	8 (5.1)	0	12 (6.3)	6 (7.7)	6 (4.8)
Significance	$\chi^2 = 3.6, p = 0.05$		$\chi^2, p = 0.3$		$\chi^2 = 0.9, p = 0.6$	
Sex						
• Male	24 (52.2)	124	6 (42.9)	142 (74.7)	42 (53.8)	106 (84.1)
• Female	22 (47.8)	(78.5) 34 (21.5)	8 (57.1)	48 (25.3)	36 (46.2)	20 (15.9)
Significance	$\chi^2 = 12.3, p = 0.6$		$\chi^2 = 6.6, p = 0.01$		$\chi^2 = 22.3, p = 0.06$	
Travel destination						
• Europe	7 (15.2)	27 (17.1)	4 (28.6)	30 (15.8)	9 (11.5)	25 (19.8)
• Middle East	21 (45.7)	66 (41.8)	7 (50.0)	80 (42.1)	33 (42.3)	54 (42.9)
• Asia (India)	18 (39.1)	65 (41.1)	3 (21.45)	80 (42.1)	36 (46.2)	47 (37.3)
Significance	$\chi^2 = 0.23, p = 0.8$		$\chi^2 = 2.8, p = 0.2$		$\chi^2 = 2.9, p = 0.2$	
Purpose of travel						
• Business	8 (17.4)	38 (24.1)	2 (14.3)	44 (23.2)	18 (23.0)	28 (22.2)
• Tourism	16 (34.8)	48 (30.4)	2 (14.3)	62 (32.6)	12 (15.4)	52 (41.3)
• Visiting friend or relatives	4 (8.7)	32 (20.3)	2 (14.3)	34 (17.9)	32 (41.0)	4 (3.2)
• Education	0	6 (3.8)	0	6 (3.2)	2 (2.6)	4 (3.2)
• Religious	16 (34.8)	6 (3.8)	8 (57.1)	14 (7.4)	4 (5.1)	18 (14.3)
• Others	2 (4.3)	28 (17.7)	0	30 (15.8)	10 (12.8)	20 (15.9)
Significance	$\chi^2 = 3.2, p = 0.6$		$\chi^2 = 36.1, p < 0.001$		$\chi^2 = 32, p < 0.001$	
Total	46 (22.5)	158 (77.5)	14 (6.9)	190 (93.1)	78 (38.2)	126 (61.8)

finding implies a higher susceptibility of exposure to travel risks. Poor risk perception was also detected in studies conducted in Gulf countries [13,15] as well as in developed countries [14,17,18].

Although more than half of the travelers had a positive attitude toward travel medicine, travel medicine services were underutilized, as only 22.5% of travelers sought travel health advice and 6.9% of the study group reported practice of any pre-travel preventive measures. Rates of utilization for pre-travel health advice have been reported in several studies ranging from as high as 86% in Johannesburg to as low as 19% in Qatar [2,13,17–19,22,23].

Of those who did seek pre-travel health advice, the Internet and private health facilities were almost equally distributed. This was consistent with the study conducted in Korea [14]. In some studies, general practitioners and travel health clinics were the most frequent source of

pre-travel health advice, as found in the Swedish and South African travelers [2,22,23].

Travelers' KAP might be affected by their personal characteristics, as well as by the characteristics of their travel. In this study, being younger (18–34 years) was detected as the only independent predictor for seeking pre-travel advice. This may be explained by the fact that younger participants are more familiar with computers and the Internet, which was rated as the most common source of pre-travel advice in this study. By contrast, this factor was not recognized as a significant predictor in relation to knowledge scores or attitudes toward travel medicine, indicating that the Internet may give incorrect information about health risks related to travel.

Although males were significantly higher than females in obtaining good knowledge scores, being female was one of the independent predictors for the practice of preventive measures. This may be affected by the fact that females take fewer risks

by nature than males and that they are more cautious about their health and visit physicians more frequently [24].

This study showed that legislations are a very important approach in the actual application of preventive measures. This was clearly shown as traveling for religious purposes, mainly to Saudi Arabia, was the most common purpose reported among travelers who applied pre-travel preventive measures with a significant difference with other groups. Saudi Arabia produces guidelines on an annual basis for the travelers going for Hajj.

Our study has many limitations; it included both Omanis and non-Omanis, it did not estimate the effect of the educational level on KAP, and it did not relate the level of knowledge to the actual practice of travel health preventive measures. Moreover, travelers of 1 week in January may not reflect all travelers.

The study demonstrated the need to establish a specialized travel medicine service with a wider scope at the national level, and to develop educational materials for all travelers that focus on the importance of seeking pre-travel health advice. Future research over a longer period of time, using a more intensive questionnaire, and including more Omani travelers to high risk destinations, will be of great benefit.

In conclusion, this study has shown an inadequate level of traveler knowledge and poor utilization of travel medicine services, and it also highlights the need for the provision of specialized travel medicine service at the national level and to develop educational material promoting pre-travel health services.

This study recommends the development of a well-structured travel medicine service with the needed promotional strategy. It also recommends repeating this study for a longer period of time, including more destinations and both international airports in the country.

Conflict of interest

None

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