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Pre-travel advice concerning vector-borne diseases received by travelers prior to visiting Cuzco, Peru



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KEYWORDS

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Summary Peru is an increasingly popular tourist destination that poses a risk to travelers due to endemic vector-borne diseases (VBDs). The objective of our study was to determine which factors are associated with receiving pre-travel advice (PTA) for VBDs among travelers visiting Cuzco, Peru. A cross-sectional secondary analysis based on data from a survey among travelers departing Cuzco at Alejandro Velazco Astete International Airport during the period January–March 2012 was conducted. From the 1819 travelers included in the original study, 1717 were included in secondary data analysis. Of these participants, 42.2% received PTA and 2.9% were informed about vector-borne diseases, including yellow fever (1.8%), malaria (1.6%) and dengue fever (0.1%). Receiving information on VBDs was associated with visiting areas endemic to yellow fever and dengue fever in Peru. The only disease travelers received specific recommendations for before visiting an endemic area for was yellow fever. Only 1 in 30 tourists received information on VBD prevention; few of

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those who traveled to an endemic area were warned about specific risks for infectious diseases prior to their trip. These important findings show that most tourists who travel to Peru do not receive PTA for the prevention of infectious and VBD, which can affect not only the travelers but their countries of origin as well.

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Introduction

Pre-travel advice (PTA) and vaccinations aim to reduce risks associated with travel [1–3]. This is especially important when tourists travel to popular destinations in tropical and subtropical areas with vector-borne diseases (VBDs) endemic to the location of interest [4]. Promotion of tropical destinations is increasing the number of trips to areas where dengue fever, yellow fever, malaria and other vector-borne diseases are endemic. Emerging hot spots of tourism in these areas pose similar risks to travelers, although each location may have unique characteristics. Peru has registered a steady growth in foreign arrivals for more than a decade with [5,6] rates of international tourists reaching approximately three and a half million per year [7,8]. In Peru, travelers may be exposed to a variety of coastal, highland, and jungle environments in just a few hours. The varied conditions and risks associated with these environments make destination-specific health advice important. Both international travelers that come to Peru and domestic tourists may be exposed to VBDs, which can cause major morbidity and mortality [9]. This risk exists in countries such as Peru where the development of travel medicine and PTA is incipient and where the few physicians that are trained in travel medicine and able to provide information about travel risks are concentrated in different major metropolitan regions, such Lima, Cusco, Iquitos and Huaraz.

Most travel medicine studies in Peru have not addressed VBDs [10–13]. Data on the prevention of conditions such as dengue fever, malaria, and yellow fever among travelers in Peru are missing, despite their importance in understanding patterns of morbidity among this population. The objective of the present study is to evaluate the factors that are associated with PTA for the prevention of VBDs among tourists visiting Cuzco.

Materials and methods

Study design

A cross-sectional study was conducted using information initially collected for a primary study. This

initial study was conducted as part of a thesis that has been approved but not yet published and compares the characteristics of foreign tourists and Peruvians living abroad visiting family and relatives in Cuzco.

Cuzco is a city in southern Peru located at 3400 m above sea level and has been the most important Peruvian destination for travelers around the world since 2007 when Machu Picchu, an Inca sanctuary, was selected as one of the new Seven Wonders of the World [14].

Collection and selection of the data

Data were collected through self-administered surveys in the departure lounge of Cuzco's international airport between January and March 2012. After the finalization of the primary study, the data collected were re-analyzed, focusing on VBDs, during the period of January–March 2013 by a group of medicine students under the guidance of the primary study author. Subjects older than 18 years were selected using convenience sampling and invited to participate voluntarily in the study. Travelers staying in Peru longer than 2 weeks were excluded from the study.

Surveys

The questionnaire was designed as a self-administered survey with open and closed-ended questions in both English and Spanish. The survey asked about basic demographic information, country of residence, travels in the last six months, pre-travel advice and recommendations given, and food-hygienic risk behaviors during their stay.

Prior to survey administration, questions were evaluated for quality by two experts on the topic and by a biostatistician, and later by a group of students and teachers, all from the unit of instrumental validation from the Master of Epidemiological Research Program of the Universidad Peruana Cayetano Heredia (UPCH), Lima, Peru. The principal investigator surveyed a group of 30 tourists who evaluated the comprehensibility of each question using a numerical scale from 0 to 10 (0=I can't understand the question, 10=I

understand perfectly the question). Questions that were evaluated and those that had a mean of less than 7 were re-phrased several times until a mean response of 8 or more than 8 points of comprehensibility was obtained. Those questions were ultimately selected for the final version of the questionnaire.

Surveys were administered by trained medical students. On the first page of the survey there was a presentation inviting the tourists to participate in the primary study and also information regarding the secondary study about the VBDs and PTA.

Variables definition

Pre-travel advice was defined as disease prevention recommendations provided by a healthcare professional to travelers before and during their stay in Peru. Subjects were asked to list all the prevention recommendations that they remembered receiving. The variables selected for this study included: gender; age; purpose of travel; seeking pre-travel advice; type of information received; and whether or not the participant received information about malaria, dengue, and yellow fever prevention in Peru.

Statistical analysis

The questionnaires were transcribed into Microsoft Excel 2010 (Redmond, WA). The statistical analysis was performed using STATA software version 11.1 for Windows (Stata Corp LP, College Station, TX). Frequencies and percentages were used to describe qualitative variables. The normality of quantitative variables was analyzed by the Shapiro–Wilk test. Means or medians were used accordingly. Bivariate regression analysis was performed and crude prevalence ratios (PR) and 95% confidence intervals (95%CI) were calculated. We used a level of $p < 0.05$ to indicate statistical significance.

Ethical guidelines

The Institutional Ethics Committee of Cayetano Heredia Peruvian University approved the protocol. Subjects verbally provided their consent to participate.

Results

Overall, 1819 international travelers were surveyed. Ninety-four travelers with residency in Peru and 8 tourists under the age of 18 years

Table 1 Characteristics of travelers surveyed in Cuzco, Peru.

Variables	<i>n</i>	(%)
Gender		
Female	932	51.7
Male	871	48.3
Age (years) ^a	32.9	(18–87.8)
Sought travel advice before departure	707	42.2
Topic of the advice received		
Transmissible diseases	199	10.9
Infectious diseases	60	3.3
Vector-borne diseases	53	2.9
Malaria	29	1.6
Dengue	1	0.1
Yellow fever	33	1.8
Received regionally specific information about vector borne diseases during consultation		
Yellow fever	6	10.5
Malaria	5	2.8
Dengue fever	0	0.0

^a Median and age range.

old were excluded. After excluding these participants, a total of 1717 participants were included in the study, 51.7% (938) of whom were female with an overall median age of 32.9 years (range: 18–87.7 years). Only 42.2% (707) of the travelers sought PTA and 2.9% (53) received medical advice on VBD prevention. Among tourists who visited or planned to visit an area endemic to VBD in Peru, 10.5% (6/57) received advice on yellow fever, 2.8% (5/179) received advice on malaria, and none (0/154) received advice on dengue fever (Table 1). Within the 106 recommendations on prevention of infectious diseases, 65% (69) of participants received advice about vaccines for specific diseases and while 8% (9) received advice regarding taking pills prophylactically. Other important recommendations participants received were concerning prevention of traveler's diarrhea (40): 26 of which were concerned prevention, 5 concerned taking pills and 3 concerned vaccination for this condition (Table 1).

A description of demographic variables of PTA is included in Table 2. Having PTA on VBDs was associated with visiting Peruvian endemic areas in yellow fever (OR = 4.4, 95%CI 1.8–10.5) and dengue fever (OR = 2.6, 95%CI 1.3–5.2). No associations were found between having PTA and sex ($p = 0.56$), age ($p = 0.15$), purpose of travel ($p = 0.93$), number of days in Peru before visiting Cuzco ($p = 0.88$), or visiting an area where is malaria endemic ($p = 0.90$) (Table 2).

Table 2 Characteristics associated with receiving medical information regarding vector-borne diseases during PTA among travelers to Cuzco.

	Was informed about vector-borne diseases during PTA?				PR (95%CI)
	Yes		No		
	N	%	N	%	
Age (years) ^a	37.7	16.0	38.7	15.8	0.99 (0.98–1.01)
Sex					
Male	19	35.9	852	48.7	0.59 (0.33–1.04)
Female	34	64.1	898	51.3	
Reason to travel					
Tourism	38	73.1	1246	71.0	1.11 (0.59–2.06)
Other	14	26.9	508	29.0	
Days in Peru before arriving to Cuzco ^a	3.8	±4.2	5.1	±12.3	0.99 (0.95–1.02)
Traveled to a malaria risk area					
Yes	6	11.3	173	9.8	1.18 (0.50–2.79)
No	47	88.7	1593	90.2	
Traveled to a dengue risk area					
Yes	12	22.6	142	8.0	3.35 (1.72–6.51)
No	41	77.4	1624	92.00	
Traveled to a yellow fever risk area					
Yes	7	13.2	50	2.8	5.22 (2.27–12.14)
No	46	86.8	1716	97.2	

PTA: pre-travel advice; PR: crude prevalence ratio obtained with logistic regression; 95%CI: confidence interval at 95%.

^a Mean and standard deviation.

Visiting an area where yellow fever is endemic was strongly associated with receiving preventive advice for that disease (OR=6.3, 95%CI 2.4–16.4). No association was found between visiting areas where malaria is endemic ($p=0.23$) and dengue fever is endemic ($p=0.99$) and receiving advice for those illnesses (Table 3).

Discussion

This study evaluated factors associated with receiving PTA about VBDs among visitors to Cuzco. This is an important topic because in Peru, travel medicine is beginning to develop and currently is only focused on treating returning travelers for disease, not prevention. This topic is also highly relevant because of the large increase in international and national tourism in the country [5,6]. Medical practitioners giving PTA to travelers who are visiting Peru need to be aware of this reality and ask for the itinerary of their patients in order to assess if they are at risk of traveling to a zone with endemic infectious diseases, particularly VBDs, and provide prevention recommendations accordingly.

Our study found that just a proportion of tourists (42.2%) had received PTA prior their trip. Ideally, all travelers should receive PTA prior to traveling

internationally. Studies around the world have found similar results on the proportion of travelers who received PTA: 36% of travelers at an international airport in New York [15], 30% of immigrants from Amsterdam [16] and 52% of passengers traveling at international airports in London, Paris and Munich [17]. The varying frequency of PTA depending on the location can be explained by findings from other studies. For example, financial considerations, language barriers, health beliefs, lack of awareness and fear of immigration authorities [18] are all factors that other studies have found affect the likelihood of receiving PTA. An even smaller proportion of tourists who visited or were planning to visit areas where VBD are endemic received prevention recommendations. Therefore, a significant number of tourists that are visiting Peru are exposed to VBDs without receiving advice and are at the risk of becoming ill and introducing these diseases into their own countries if epidemiological conditions are suitable [1,18].

Our study found that 4 of 10 tourists sought advice from a healthcare practitioner when preparing for their trip. Similarly, studies conducted at other tourist destinations have reported that between 30 and 50% of travelers seek pre-travel advice [18–21]. In contrast, a previous study in Cuzco showed that 93.6% of travelers sought PTA

Table 3 Analysis of specific disease information received during PTA according to travel to endemic vector-borne disease area in Peru.

Traveled to an area in Peru with:	Vector-borne disease information received during PTA				OR (95%CI)
	Yes		No		
	N	%	N	%	
Malaria					
Yes	5	2.8	174	97.2	1.93 (0.72–5.14)
No	24	1.5	1616	98.5	
Dengue fever					
Yes	0	0	154	100.0	–
No	1	0.1	1664	99.9	
Yellow fever					
Yes	6	10.5	51	89.5	7.56 (3.00–19.11)
No	27	1.5	1735	98.5	

PTA: pre-travel advice; PR: crude prevalence ratio obtained with logistic regression; 95%CI: confidence interval at 95%.

before departure and 60% of them received this advice from a healthcare professional [16]. This difference may be explained by differences in the profiles of the travelers that arrive in Cuzco, the risk profile of the itineraries of those included in the study, and the study designs.

The number of travelers that are at risk of becoming infected with a VBD and who received specific information about their destination was low (10.5% for yellow fever, 2.8% for malaria, and 0% for dengue fever). Travelers' risk perceptions and willingness to seek professional health professional advice may have caused these low rates in our study population. In addition, barriers to travel consultation, advice recollection, and compliance with advice were have been described in other studies [20,21]. Travelers with little or no knowledge about their exposure risk are more vulnerable to becoming infected with vector-borne diseases endemic to Peru.

Yellow fever prevention information was more often provided to travelers visiting yellow fever risk areas compared to the advice for other VBDs. The severity of yellow fever and the availability of a highly effective vaccine may have influenced healthcare professionals' decisions regarding providing this advice. Although yellow fever has a high case fatality rate, malaria and dengue fever are far more common and cause more deaths among travelers [22]. Few travelers were counseled about dengue fever prevention, implying that limited information regarding mosquito bites was received as well. The same precautions for dengue fever and mosquito bites may aid in the prevention of other VBD in overlapping endemic areas in Peru. This is especially important in Peru,

where the vast majority of travelers does not contact a travel agency before arriving and rely on local services [23]. Additionally, internationally, travel agencies usually perceive PTA to be important and recommend clients seek guidance from healthcare professions according to international recommendations and international health regulations.

This study was a secondary data analysis and, as a result, has different study limitations. First, a number of factors that that may influence rates and the type of VBD advice sought by travelers were not evaluated, such as: having a disease in a previous travel; having a relative, friend, or doctor suggest having a physical prior to travel; or media influence on seeking PTA, for example [23]. Additionally, a convenience sample was used, which limits the generalization of these results to other groups. Finally, a limited number of subjects at risk for VBDs were included, limiting the power of the analysis.

Conclusion

In conclusion, a small proportion of travelers who were at risk for VBDs in Peru received PTA. This is concerning given that beyond individual risk for the disease, a tourist infected with a VBD also risks spreading the infectious disease to their country of origin. When PTA was received, advice was primarily focused on yellow fever prevention; this was also strongly associated with traveling to a yellow fever risk area. Analyzing the sociodemographic characteristics of travelers that received

PTA can be useful for identifying new characteristics among those who have PTA and using these findings to design other studies. Additionally, these findings can encourage health and travel institutions in many countries to implement appropriate strategies aimed at groups characterized from the findings of this study and others in the future. Additional efforts focused on the prevention of malaria and dengue are needed, as well as for other emerging VBDs such as Chikungunya and Zika which have now appeared in Latin America [24,25]. Future improvements to VBD will also generate political motivation for supporting the development of travel medicine in Peru.

Authors' contributions

Christian R. Mejia was responsible for the conception and design of the work, in addition to the contribution to the study data, and providing statistical, technical and administrative advice. Christian R. Mejia also critically revised the manuscript along with Alfonso J. Rodriguez-Morales. Both, together with Aleksandar Cvetkovic-Vega, Emperatriz Centeno, Brigitte Cruz and Edison Delgado Valencia approved the final manuscript. Collection and delivery of results was by Edison Delgado, who along with Emperatriz Centeno, Brigitte Cruz and Aleksandar Cvetkovic drafted the manuscript.

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Competing interests

None declared.

Ethical approval

Not required.

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