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Epidemiology of travel-associated infections in Oman 1999–2013: A retrospective analysis

Seif S. Al-Abri [a,*], Doaa M. Abdel-Hady [b], Salem S. Al Mahrooqi [b], Hanan S. Al-Kindi [c], Amina K. Al-Jardani [c], Idris S. Al-Abaidani [b]

[a] *Directorate General for Disease Surveillance and Control, MoH, Oman*
[b] *Department of Communicable Diseases, MoH, Oman*
[c] *Central Public Health Laboratory, MoH, Oman*

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Summary *Background:* The number of travelers in Oman has increased significantly in the last 2 decades with an increase in the expatriate population workforce leading to the emergence of infections related to travel. This paper aims to highlight the burden of travel-related infections in Oman.
Method: Our study is a descriptive record-based review and analysis of travel-associated diseases over a 14 year time period from 1999 to 2013. The data was sourced from the communicable disease surveillance system, and central public health laboratory results.
Results: From 1999 to 2013 there were a combined total of 7022 cases of cholera, chikungunya, dengue, filariasis, leptospirosis, meningococcal infection, poliomyelitis, measles, schistosomiasis, viral hepatitis (A), typhoid and para-typhoid reported to and subsequently investigated by the Department of Communicable Diseases. Among these cases, 558 (7.9%) were attributed to travel. Fifty percent of these patients were admitted to hospitals.
Conclusion: Travel-associated infections account for about 8% of notifiable infections in Oman and have low mortality rate. However, some travel-associated infections are considered as a threat to polio eradication and measles elimination programs. Furthermore, some can cause outbreaks that can overwhelm the healthcare system.

* Corresponding author.
E-mail addresses: salabri@gmail.com (S.S. Al-Abri), doaahady2000@gmail.com (D.M. Abdel-Hady), salem.mahrooqi@gmail.com (S.S. Al Mahrooqi), drhananalkindi@gmail.com (H.S. Al-Kindi), draljardani@hotmail.com (A.K. Al-Jardani), dr.idris.oman@gmail.com (I.S. Al-Abaidani).

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1. Introduction

Since the advent of modern commercial aviation in the 1950s, and over the past 6 decades, international civilian travel globally has experienced continued expansion and virtually uninterrupted growth from 25 million in 1950 to 278 million in 1980, 528 million in 1995, and 1087 million in 2013. It is expected that international tourist arrivals globally will increase by 3.3% a year from 2010 to 2030 to reach 1.8 billion by 2030 [1].

International travel exposes individuals to new cultural, psychological, physiological and microbiological exposures and challenges. The tourists' and migrants abilities to adopt, cope and survive are influenced by many variables such as the visited region, the length of the trip and the diversity of planned activities [2]. These variables are modified by personality, experiences and behavior; and they differ according to age, gender, culture, race, social status and education [3]. Infectious disease risks for international travelers are moving targets, as new diseases have emerged and old ones have re-emerged. The diseases that travelers come in contact with have changed. Some countries have become safer overall, but other countries are experiencing new diseases or the re-emergence of past diseases. For example, travelling to the developing world necessarily puts travellers and migrants at risk for infectious diseases, with 20%—70% of returned travellers suffering some sort of illness [4—6].

International travelers can experience travel-related morbidity during and after travel. Of the approximately 50 million people who travel from industrialized countries to developing countries each year, 8% report becoming ill enough to seek health care either during or after travel [7]. Many other travelers also experience health problems that often go unreported [8].

Travel-related illnesses may have important calamitous public health consequences if conditions for re-introduction of diseases are met [9]. Traveling contributes to the global spread of infectious diseases, including novel and emerging pathogens; the global epidemic of Severe Acute Respiratory Syndrome (SARS) in 2003 was a prime example [10]. More recently, international travelers infected with novel H1N1 influenza played a major role in the rapid global spread of the virus [11]. Travelers have also carried pathogens to areas of the world where these pathogens were rare or had been eliminated. Recent outbreaks of vaccine-preventable diseases such as measles [12] and mumps [13] in the United States have been traced to contact with persons who had traveled to locations where vaccination was less prevalent. In addition, travel and migration have contributed to recent introduction or reintroduction of vector-borne diseases in places that had been free from these diseases, such as locally acquired dengue in Florida [14], malaria in Greece [15] and also in Great Exuma Island in the Caribbean [16].

The Sultanate of Oman is located in the south-eastern part of the Arabian Peninsula with land area of 309,500 square kilometers. The country is divided into 11 administrative governorates; with a with a total population of 4,156,967 and about 43.5% of them are expat [17]. Most of the population is located in the north and south of the country. Oman has achieved remarkable developments in health care within a relatively short span of 4 decades and has developed a good infrastructure for health services. Health care in Oman is largely the responsibility of the state and the cost is borne by the government. As of 2013, the Ministry of Health (MOH) had 195 primary care centers and 49 hospitals. Out of these 49 hospitals, there are 4 in the capital area of Muscat, which offer tertiary care services. The primary health centers offer primary care services to the population residing in the assigned catchment area of the center. The secondary and tertiary care services are provided through a referral process.

The objective of this retrospective descriptive study of the travel-associated infections in Oman between 1999 and 2013 is to identify the burden of travel-associated infections and to develop risk profiles for the most common travel-related infections in Oman.

2. Methods

A retrospective descriptive record-based review and analysis of travel-associated diseases was conducted over the period from 1999 to 2013.

All travel-associated infectious diseases that were reviewed and included in this study were detected by the routine communicable disease surveillance and the central public health laboratory results during the specified study period.

The studied travel-related infections include: dengue, chikungunya, cholera (classical form), lymphatic filariasis, Neisseria meningitides, measles, Schistosoma haematobium, poliomyelitis, leptospirosis and typhoid. The patient should be a resident in Oman who met the case definition for the specific disease. In addition, subjects must have reported traveled to a country endemic with that disease during the investigation, and should have been out of Oman during the full incubation period of the disease. Case definitions were based on the National Communicable Diseases Surveillance and Control SOP manual [18]. As malaria surveillance in Oman is a separate program, data about malaria was not included in this study. However, all malaria cases reported during the study period were imported [19].

Included subjects are residents of Oman (Omani and non-Omani), based on the clinical presentation and incubation period of each disease, included subject has to be free from the infection under consideration (manifesting or incubating) before travelling, and has to meet the case definition for the specific disease.

The primary dependent variables for the surveillance data were the diagnosed travel-associated diseases. Independent variables include: basic demographics (age, sex and nationality), country of exposure and disease progression (admission and outcome).

Data analysis was conducted using SPSS (statistical program for the social science, version 18). Frequency distributions were used to determine the percent of travel-associated infections.

This study is free from any ethical constraints as it is a secondary analysis of the data collected routinely for the purpose of public health surveillance and reporting. The data analysis was conducted at the Department of