

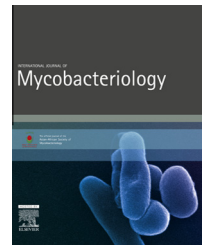
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Review

Nontuberculous mycobacteria in Middle East: Current situation and future challenges



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ABSTRACT

Nontuberculous mycobacteria (NTM) are a diverse group of bacterial species that are distributed in the environment. Many of these environmental bacteria can cause disease in humans. The identification of NTM in environmental sources is important for both clinical and epidemiological purposes. In this study, the distribution of NTM species from environmental and clinical samples in the Middle East was reviewed. In order to provide an overview of NTM, as well as recent epidemiological trends, all studies addressing NTM in the Middle East from 1984 to 2014 were reviewed.

A total of 96 articles were found, in which 1751 NTM strains were isolated and 1084 of which were obtained from clinical samples, 619 from environmental samples and 48 were cited by case reports.

Mycobacterium fortuitum was the most common rapid growing mycobacteria (RGM) isolated from both clinical (269 out of 447 RGM; 60.1%) and environmental (135 out of 289 RGM; 46.7%) samples. *Mycobacterium avium complex* (MAC) was the most common slow growing mycobacteria (SGM) isolated from clinical samples (140 out of 637 SGM; 21.9%). An increasing trend in NTM isolation from the Middle East was noted over the last 5 years. This review demonstrates the increasing concern regarding NTM disease in the Middle East, emphasizing the need for regional collaboration and coordination in order to respond appropriately.

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Introduction

Nontuberculous mycobacteria (NTM) have been recognized as a diverse group of organisms that are ubiquitous in environmental sources [1]. In most regions of the world, NTM are not reportable public health diseases, so epidemiological data are not easily available [2]. However, data in published studies note increasing trends in the rate of NTM isolation from different geographic regions in the world. Increasing NTM isolation may have important public health implications [3]. Exposure to these organisms can cause serious infections in both immunocompetent and immunocompromised individuals [4]. According to the latest report released by WHO, about 35.3 million people in the world are living with HIV/AIDS, which represents one of the most vulnerable populations to NTM infection, as well as a higher risk for complications and poor disease outcomes [5]. Those receiving immunosuppressive therapy secondary to organ transplantation, cancer, autoimmune disease and those with diabetes mellitus may also be more susceptible to NTM as compared with the general population, as well as suffer more severe diseases. The incidence of NTM infections is growing all over the world. Although countries in the Middle East have increasingly reported NTM diseases [6], no comprehensive study of NTM distribution has been conducted in this region. The purpose of this review is to piece together clinical and environmental NTM data reported in peer-reviewed published literature in Middle Eastern countries over the last 30 years.

Methods

Literature search strategy

This study was conducted by reviewing published literature from the Middle East using PubMed and Scopus for NTM during the study period 1984–2014 using search terms “atypical mycobacteria” [MeSH] AND “Middle East” [MeSH] OR “nontuberculous mycobacteria” [MeSH] AND “Middle East” [MeSH] OR “environmental mycobacteria” [MeSH] AND “Middle East” [MeSH].

Inclusion and exclusion criteria

Original articles that presented cross-sectional or cohort studies and reported the incidence of NTM in the Middle East

were considered. Congress abstracts and studies using non-standard methods were excluded.

Data extraction and definitions

For all studies, the following data were extracted: year of publication, study setting, studies enroll time, and number of patients investigated. Inconsistencies between the reviewers were discussed to obtain consensus.

Data collection

The present study search strategy aimed to identify all available published studies that reported data on the incidence of NTM in the Middle East. A total of 379 articles were identified.

Although 298 irrelevant subjects were excluded, after full text evaluation, 96 papers (original and case report articles) describing the incidence of NTM in the Middle East countries were selected for analysis.

Countries included in the study

Countries were divided in two groups: Middle East countries and Eastern neighbors of Iran (Afghanistan, Pakistan). Data were provided from 11 countries, including Iran (34 articles) [7–40], Turkey (21 articles) [41–61], Saudi Arabia (18 articles) [62–79], Lebanon (5 articles) [80–84], Qatar (4 articles) [85–88], Pakistan (4 articles) [89–92], Iraq (3 articles) [93–95], Egypt (2 articles) [96,97], Bahrain (2 articles) [98,99], Kuwait (2 article) [100,101], and Oman (1 article) [102]. No NTM data was reported in the remaining Middle Eastern countries, including Jordan, the United Arab Emirates, Syria, Yemen and Afghanistan.

Results

Out of the 96 articles identified in the search, 48 were original articles and the remaining were case reports. From 48 original articles, 20 studies were conducted in Iran and 13 in Turkey. The remaining reports were obtained from Pakistan (3), Lebanon (3), Saudi Arabia (3), Iraq (3), Egypt (1), Kuwait (1) and Oman (1).

In total, 1751 NTM strains were isolated from the original studies and case reports during the study period. Among the 1751 NTM isolates, 1084 were obtained from clinical

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