

Allergic Rhinitis in the Middle East

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Background: Current military operations in the Middle East involve active duty, National Guard, and reserve troops from all services. Despite common misconceptions, the desert environment in this region has significant aeroallergen seasons that may exacerbate allergic rhinitis. **Objective:** To review perennial and seasonal aeroallergen trends in the Middle East. **Results:** Most countries have significant grass and weed pollen seasons during April to May and September to October, respectively. Indigenous trees such as date palm, acacia, and mesquite have specific pollen seasons from March to May. Mold allergens are perennial with seasonal peaks, whereas house dust mite is common in humid coastal regions. **Conclusions:** Seasonal and perennial allergens observed in the United States are also found in the Middle East. Furthermore, the prevalence of allergic rhinitis in these countries suggests that local aeroallergens exacerbate symptoms. Health care providers should counsel deploying soldiers with allergic rhinitis regarding relevant allergen trends, ensuring that these individuals have appropriate medications.

Introduction

Allergic rhinitis, a common condition, currently affects 10 to 25% of the U.S. population.¹ Symptoms typically include sneezing, rhinorrhea, nasal congestion, and ocular pruritus. Most individuals have mild symptoms, but moderate to severe exacerbations may occur during peak pollen exposure. Allergic rhinitis is also a risk factor for sinusitis and asthma.²

During the past 1.5 years, >250,000 military personnel have deployed to the Middle East (Fig. 1). Before deploying, these individuals may be receiving their health care from military or civilian providers. Although the Middle East is generally regarded as a desert environment, there are significant seasonal aeroallergens.³⁻²¹ These aeroallergens may result in symptom worsening, use of medical resources, and even reduced combat effectiveness. Here, a review was conducted using a Medline search with the keywords "allergic rhinitis," "aeroallergen," and "pollen" for the countries of Bahrain, Kuwait, Iran, Iraq, Jordan, Oman, Qatar, Turkey, Saudi Arabia, Syria, Yemen, and the United Arab Emirates (UAE).

Observations and Results

Kuwait

Kuwait is a small country (~18,000 km²) situated on the northwestern aspect of the Arabian Gulf. Kuwait's temperatures reflect its desert climate, ranging from 45°F in the winter to 115°F in the summer. Humidity also varies, ranging from 27 to

31% in the summer to 65 to 75% in the winter.³ Despite scant rainfall, oil revenue and Western influence have led to increased grass and tree cultivation.³

Behbehani et al.⁴ identified two seasonal pollen peaks in Kuwait. Grass (*Gramineae* spp.) peaked from April to May and weeds (*Chenopodiaceae* spp. and *Amaranthaceae* spp.) from September to October. These pollens appear to be the dominant aeroallergens, because they are commonly identified during allergy skin testing and pollen surveys.^{5,6}

House dust mite (HDM), cat, and cockroach allergens are found in public places (e.g., mosques, restaurants, nurseries, hospitals, cinemas, and schools) but do not reach levels that are typically associated with symptom exacerbation.⁷ Levels of Fel d 1, the major cat allergen, varied greatly in 274 homes without cats (median, 0.72 µg/g; range, 0.04–11.60 µg/g). A Fel d 1 level of 2 µg/g is associated with allergic rhinitis sensitization.⁷ Rates of cat and dog ownership are low, in accordance with cultural habits, but stray animals are common and most homes have floor carpets or rugs that may allow dander to persist.

Indoor and outdoor molds, predominantly *Alternaria*, *Aspergillus*, *Cladosporium*, and *Penicillium*, primarily occur during November to January and July.⁸ Mold sensitization may have a greater impact for individuals with asthma, rather than allergic rhinitis alone.^{3,5}

UAE

The UAE, situated between Saudi Arabia and Oman, is ~75,600 km² in size and is divided into four regions, namely, a desert plain prone to frequent dust storms, sandbars and islets along the Persian Gulf coast, mountains reaching 2,500 m (8,000 feet) in eastern UAE, and a fertile coastal strip. The UAE has two distinct seasons, winter and summer. Winter, lasting from December to March, has mean daily temperatures of 59°F (range, 41–105°F). Annual rainfall averages <5 inches, and frequent dust storms occur from June through September. A humid southeastern wind, commonly referred to as the "sharqi," results in coastal humidity exceeding 85% through most of the summer. Inland humidity averages 40%.¹⁰

Two studies reported airborne allergens and skin test sensitivity in the UAE.^{9,10} Similar to Kuwait, *Gramineae* spp. and *Chenopodiaceae* spp. represent the predominant allergens. Bermuda grass (*Cynodon dactylon*) has been imported to the country and grows year-round.¹⁰ Common weed aeroallergens indigenous to the UAE include Russian thistle (*Salsola imbricata*), firebrush (*Kochia scoparia*), and lamb's quarter (*Chenopodium album*). Ragweed is not present. Mesquite and acacia, trees found in the southwestern United States, are also common and resulted in positive skin tests for 45% and 25% of individuals with allergic rhinitis, respectively.⁹ Mold and goat allergens were occasionally positive during skin testing (5–7%), but their impact is unknown because no aerobiological surveys for these allergens have been reported.⁹

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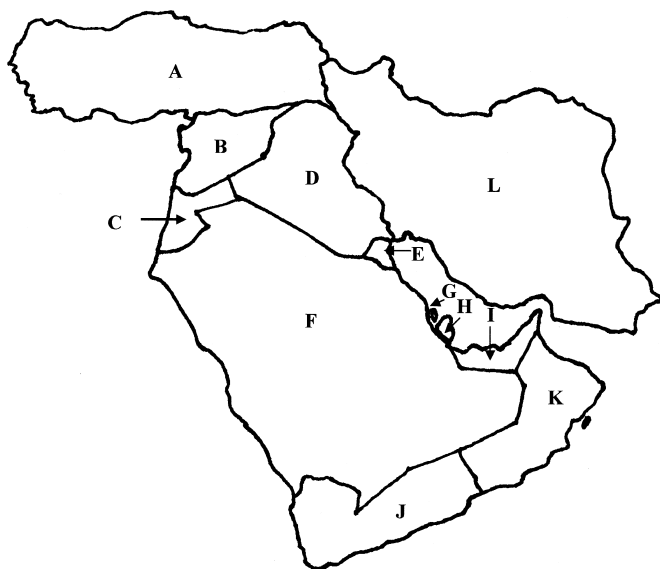


Fig. 1. Middle Eastern countries, including Turkey (A), Syria (B), Jordan (C), Iraq (D), Kuwait (E), Saudi Arabia (F), Bahrain (G), Qatar (H), UAE (I), Yemen (J), Oman (K), and Iran (L).

Perennial allergens, including HDM, cockroach, and cat dander, were positive during skin testing for 20%, 8%, and 8% of individuals with allergic rhinitis, respectively.¹⁰ HDM sampling has not been reported, but high humidity in the coastal region can easily support HDM proliferation, which occurs when the humidity is consistently above 50%. A cross-sectional survey among schoolchildren found that 40% of homes had pets, primarily cats and goats.¹¹

Qatar

Qatar, a small country of ~11,000 km², has a climate similar to that of other countries in the region, characterized by hot summers (May to October) and mild winters (December to March). Frequent dust storms occur from March to August. HDM was the most common positive skin test (43%), perhaps reflecting the high humidity.¹² Cockroach was the second most common positive skin test (16%), whereas *Chenopodiaceae* spp. remained the most common positive seasonal pollen skin test (12%).¹²

Oman

Oman, a country of ~212,000 km², is similar in climate to the UAE. The country is divided into a humid coastal region and an arid desert. Summer temperatures (April to October) may reach 130°F, and sandstorms are frequent. No studies have reported skin testing with aeroallergens or airborne pollen counts, but >7,000 Omani children completed the International Study of Asthma and Allergies in Childhood questionnaire.¹³ The rate of self-reported symptoms of chronic sneezing and nasal congestion in the absence of a cold or viral illness was 22%, with a 1-year prevalence of "allergic hay fever" of 7.5%.¹³

Iran

Iran is divided into a mountainous region, a central highlands area composed of several closed basins and two salt deserts, and a lowlands coastal plain along the Caspian Sea and Persian Gulf.

Climates are similar to those found in Iraq, with hot summer and mild winters. Hay fever in the Middle East was described as early as the 8th century A.D. by an Iranian physician, Mohammad ben Zakariya al-Razi, who observed his mentor suffering from sinus pain and inflammation each year during the "time of flowering."¹⁴ One study measuring HDM levels in homes in coastal regions found levels high enough to be associated with sensitization and development of allergic rhinitis, whereas HDM levels remained low in noncoastal areas.¹⁵ Pollen surveys have not been reported.

Iraq

The majority of U.S. forces are stationed in Iraq, a country nearly 435,000 km² in size. Iraq has dry desert regions south and north, with a fertile Lower Mesopotamian Plain supported by the Tigris and Euphrates rivers. Dust and sandstorms occur year-round but are most severe from May to October. One limited mold survey in Baghdad showed intermittent peaks of *Aspergillus*, *Alternaria*, *Hormodendrum*, and *Penicillium*.¹⁶ Seven individuals were tested with several seasonal aeroallergens and had positive skin tests with grass, weed, and tree pollens.¹⁶ No information regarding corresponding aerobiological pollen surveys has been reported.

Saudi Arabia

Saudi Arabia is ~2.2 million km², approximately one-fifth the size of the United States. The country is divided into four regions, i.e., mountainous western highlands, a rocky central plateau, a more fertile, humid, eastern coastal plain, and sandy desert areas in the north, east, and south that constitute >50% of the country. Weeds (*Chenopodiaceae* spp.) and grasses (*Gramineae* spp.) represent the most common aeroallergens. In studies conducted in Riyadh, grasses typically peaked from May to June but were found throughout the year.^{17,18} Year-round pollination is probably supported by the warm climate and increased irrigation. Weed pollen is also perennial, with peaks during May to June and September to October.¹⁷ Common indigenous trees such as acacia, palm, and mesquite reach significant pollen levels but are restricted March, April, and May.¹⁷ Airborne molds are found throughout the year, with *Cladosporium*, *Penicillium*, and *Aspergillus* accounting for 75% of all molds. Surprisingly, only 3 of 10 homes sampled for HDM in eastern Saudi Arabia, an area with high humidity, tested positive.¹⁸ Few homes have either cats or dogs.¹⁹

Turkey

Turkey is a large country, ~815,000 km² in size. The eastern region bordering Iraq is extremely mountainous, whereas the central region, the Anatolian plateau, is less mountainous but maintains a desert environment, with sparse rainfall, hot summers, and cold winters. Aerobiological studies have been conducted in the capital, Ankara, and Adana, a city near Incerlik Air Force Base.^{20,21} Grass pollen peaks in Ankara from April to August, whereas weeds increase from July to October. *Pinaceae* spp. (pine) was significantly elevated from May to June. No pollen was detected from December through February, most likely reflecting the cold climate in the country's interior.²⁰

Adana, Turkey's fourth largest city, which is located on the Mediterranean Sea, has pollen year-round. Trees accounted for

the majority (82%) of total pollen, with *Cupressaceae* (cypress), *Tazaceae* (cedar and juniper), and *Eucalyptus* being most common. Grasses remained low throughout the year, whereas weeds increased from March to October.²¹ Perennial allergens such as HDM, cockroach, and cat were less common; however, cat allergen reached sensitization levels in many homes, a finding attributed to an abundance of stray cats.²¹

Bahrain, Jordan, Syria, and Yemen

No studies were found regarding allergic rhinitis or aeroallergen pollen surveys.

Discussion

During the past two decades, Arabian Gulf countries have undergone rapid development, with oil-rich countries changing from a rural life to wealthier urban societies.³ As a result, most homes have wall-to-wall carpeting and air conditioning.³ Similar to Western countries, increasing urbanization parallels a rise in allergic rhinitis.³

Aeroallergenic pollen seasons in the Middle East are similar to those in the United States. Tree pollens typically peak in the spring, grasses peak in the late spring and summer, and weeds peak in the fall. In the fertile coastal regions, grass pollen is found year-round, a phenomenon also seen in southern California and Florida. Unfortunately, only one small study regarding aeroallergens has been published from Iraq.¹⁶

During the initial Persian Gulf War in 1991, asthma was one of the most common diagnoses resulting in theater medical evacuation.²² Dust can irritate asthma but may also carry significant pollen that may trigger asthma. Up to 78% of patients with asthma have allergic rhinitis and 38% of patients with allergic rhinitis have asthma, suggesting that there may be a link between the two processes.²³ Abdulrahman et al.¹⁷ found that up to 50% of pollen could not be identified because of damage or obstruction by dust.

Understanding the aerobiological features of countries in this region may better prepare health care providers counseling soldiers with allergic rhinitis. Studies providing more comprehensive aeroallergen surveys for Iraq and surrounding countries where the United States currently maintains an operational presence should be considered.

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