

Respiratory Tract Infection among Hajj Pilgrims

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Abstract

The Hajj has become the epicenter of mass migration of millions of Muslims of enormous ethnic diversity. No other mass gathering can compare, either in scale or in regularity. Respiratory tract infection during Hajj (pilgrimage to Mecca) is a common illness, and it is responsible for most of the hospital admissions. Influenza virus is the leading cause of upper respiratory tract infection during Hajj, and pneumonia can be serious. Taking into account the close contacts among the pilgrims, as well as the crowding, the potential for transmission of *M. tuberculosis* is expected to be high. Although vaccination program for influenza is implemented, its efficacy is uncertain in this relus season. Future studies should concentrate on prevention and mitigation of these infections.

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Introduction

Hajj is a religious duty undertaken by Muslims at least once in their lifetime, and it is one of the largest annual gatherings in the world. Approximately over 2.5 million people from different parts of the world with different medical and social backgrounds travel to Mecca and congregate together to perform their rituals in a small area defined for the pilgrimage. Thus crowding, fatigue and the extreme climatic conditions are important factors for transmitting infections. Respiratory tract infections are in fact one of the leading types of infections seen during the Hajj season."Among bacterial pathogens the following have been more frequently reported by authors: Haemophilus influenzae, Klebsiella pneumoniae, Streptococcus pneumoniae, Staphylococcus aureus, and Streptococcus pyogenes" [1-3]. On the other hand Alzeer et al. demonstrated that tuberculosis is the commonest cause of pneumonia requiring hospitalization during Hajj. They also re-

ported that gram negatives bacteria, Legionella pneumophila and Mycoplasma pneumoniae are interfering pathogens too."Moreover, prior investigators have proposed influenza virus type A & B, adenovirus, parainfluenza, respiratory syncytial virus (RSV), herpes simplex virus (HSV) and enterovirus as the most frequent causative viruses" [4]. This imposes considerable burden by way of increased health-care costs and hospital bed demand, as well as lost workdays and may disseminate infection across continents. This review discusses upper and lower respiratory tract infections occurring during the Hajj season, and their effect on pilgrims' health.

Upper Respiratory Tract Infection

Acute upper respiratory tract infection (ARI) is a common illness during Hajj. There are no comprehensive studies on the epidemiology and statistics of ARI during Hajj. As most data were obtained from cross-sectional studies on a relatively small number of patients



it has been estimated that 1 in 3 pilgrims will experience respiratory symptoms which usually start at the end of or shortly after the end of the Hajj season. Typical symptoms include cough, sputum production, sore throat, hoarseness of voice, rhinorrhea, fever and malaise. Cough may persist for several weeks and if it is accompanied by purulent sputum, it suggests the possibility of a superimposed bacterial infection. "Respiratory infections could be complicated by exacerbations of asthma, chronic obstructive pulmonary disease, sinusitis and pneumonia" [5].

Several transmissible viral respiratory infections have been reported to cause these illnesses. "Influenza viruses are the most common, followed by respiratory syncytial viruses (RSV) and adenoviruses" [6-8]. Rhinovirus infection was more commonly reported among UK pilgrims as compared to influenza, and the attack rate of ARI was higher when compared with local Saudi pilgrims (25% vs. 13%, respectively). "The higher rate of ARI in UK pilgrims was partly attributed to the longer time spent by them in Mecca and the Grand Mosque as compared to the local pilgrims" [9]. In the Hajj season of 2003, Balkhyet al. examined the throat swabs of 500 patients with upper respiratory tract infection and found 54 (10.8%) patients with positive cultures, including 27 (50%) influenza B, 13 (24.1%) herpes simplex virus, 7 (12.9%) RSV, 4 (7.4%) parainfluenza and 3 (5.6%) influenza A [7]. In the 2004 season, Al Salehet al. isolated influenza type B in 72.7% of the 46 confirmed influenza cases; with Sichuan as the predominant serotype (70.9%), followed by Flu A (not typed, 14.6%; Flu A H1N1, 7.3%; Flu A H3N2, 5.5%) and Flu B Hong Kong (1.8%). In contrast to, during the 2005 season, Rashid et al. examined nasal swabs of 205 patients using real-time polymerase chain reaction (RT-PCR). Influenza A accounted for 56.7% (21/37) of the confirmed cases, followed by RSV (24%, 9/37) and influenza B accounted for (18.9%, 7/37) [10]. "The main influenza strains were different in these years, suggesting that as with typical seasonal influenza epidemics, the circulating viruses are different in various years" [11].

The magnitude of viral illnesses occurring during Hajj has the potential for triggering an influenza pandemic. It would seem prudent to regard all Hajj pilgrims to be at risk. Therefore collaborative measures nationally and internationally should be undertaken to prevent possible pandemics. The World Health Organization (WHO) should work closely with Saudi health authorities to minimize the spread of these viruses. It is also important to identify surveillance studies as indicators of activity for a possible influenza pandemic.

The role of the influenza vaccine has been established in reducing mortality and morbidity of influenza. Both inactivated and live attenuated vaccine prevented

about 70% of cases of laboratory-confirmed symptomatic influenza in healthy adults." Recent data regarding UK pilgrims showed that the rate of influenza was lower in a vaccinated group as compared to an unvaccinated group (7% and 14%, respectively)" [12,13]. The Saudi health authorities recommend vaccination of all pilgrims at the age of 65 years and of those who are at high risk." Despite this recommendation, data show that a vaccination program is not widely implemented; for example, in the 2003, the reported influenza vaccination rate was 4.7% among a group of 500 pilgrims. Similarly, these vaccination rates must be improved by implementing strategies that include education of health-care providers and by making vaccination a prerequisite for acquiring a Hajj visa" [14, 15]. At present, the Saudi health authorities do not recommend universal influenza vaccination; it is desirable that all pilgrims including those at low risk should receive the influenza vaccination.

Anti-viral chemoprophylaxis has been used in annual influenza epidemics as an adjunct to influenza vaccine. Only 2 drugs, both neuraminidase inhibitors, are currently recommended for preventing or treating influenza: Zanamivir (Relenza) and oseltamir (Tamiflu). "Patients should be started on anti-viral medications within 48 hours of contracting ARI" [16]. However these drugs are not widely used due to their high cost. Although the US CDC suggests that surgical face masks do not provide adequate filtering of small respiratory particles, it may be desirable to use at least among males, particularly in semi-closed areas." Encouraging respiratory hygiene measures such as frequent hand washing and disinfectants are essential measures in preventing cross-infection" [17,18] .

Lower Respiratory Tract Infection

Diagnosis and treatment of pneumonia in a mass-gathering situation is a medical challenge requiring quick decision making and knowledge of its etiology." In 2003, pneumonia was the leading cause of hospital admissions during Hajj, (accounting for 39%); and the second leading cause of ICU admissions" [15] .Biological agents of pneumonia in Hajj have not been extensively studied before. Data also suggest that the decreased cell-mediated immunity due to overcrowding, exhaustion and undernourishment can result in a high incidence of pneumonia and in particular, outbreak of a "caseous" form of pulmonary tuberculosis." A recent data from Singapore reveals that using QuantiFERON TB assay, 10 (15%) of the 149 pilgrims who were negative prior to Hajj had a significant rise in immune response to TB 3 months after Hajj. Moreover the skin reactivity to TB and annual risk of infection were 3 times higher in Saudi cities hosting pilgrims compared to the corresponding national averages"

[19]. This was attributed to contact with pilgrims from developing countries that have a high prevalence of tuberculosis. In addition to, most of the international pilgrims travel by air, often for a long journey. This may prove to be a significant mode of spread of infection, especially with crowded chartered flights with many susceptible individuals on board.

The data highlight the possible high rate of *M. tuberculosis* cross-infection among pilgrims returning from Mecca, who may act as a potential reservoir for TB. From a public health perspective, they emphasize the need for a feasible and well-defined strategy to minimize the risk of infection. Such a strategy should include screening pilgrims before allowing them to enter Saudi Arabia.

In summary, respiratory tract infection during Hajj continues to exert a burden on pilgrims. Since data is lacking, the Saudi Ministry of Health must establish a registry for these infections. Future studies should focus on the prevention, diagnosis, epidemiology and management of these respiratory diseases in this large heterogeneous population, as Mecca will always be “once-in-a-lifetime destination” for all capable Muslims. The WHO and ministries of health in countries from which pilgrims originate should cooperate with Saudi authorities for exchange of health-related information.

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Conflict of Interests

None Declared.

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