

Incidence of Hajj-associated febrile cough episodes among French pilgrims: a prospective cohort study on the influence of statin use and risk factors

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Abstract

A prospective epidemiological study was conducted to evaluate the incidence of febrile cough episodes among adult Muslims travelling from Marseille to Saudi Arabia during the Hajj pilgrimage and to assess if use of statin had an influence on this incidence. In total, 580 individuals were presented with a questionnaire. A significant proportion of individuals had chronic medical disorders, e.g. diabetes mellitus (132, 22.8%) and hypertension (147, 25.3%). Pilgrims had a low level of education and a low employment rate. Sixty (10.3%) were treated with statins for hypercholesterolemia. Four hundred and forty-seven pilgrims were presented a questionnaire on returning home. A total of 74 travellers (16.6%) experienced fever during their stay in Saudi Arabia (67 attended a doctor) and 271 (60.6%) had cough (259 attended a doctor); 70 travellers with cough were febrile (25.9%). Seventy per cent of the travellers who suffered cough episodes developed their first symptoms within 3 days, suggesting a human to human transmission of the responsible pathogen, with short incubation time as evidenced by a bimodal distribution of cough in two peaks at a 24 h interval. None of demographical and socioeconomic characteristics, underlying diseases or vaccination against influenza significantly affected the occurrence of cough. Diabetes correlated with an increased risk of febrile cough (OR = 2.02 (1.05–3.89)) as well as unemployment (OR = 2.22 (0.91–5.53)). Use of statins had no significant influence on the occurrence of cough and/or fever during the pilgrimage. This result suggests that while treatment with a statin has been demonstrated to reduce the mortality from severe sepsis associated with respiratory tract infections, it probably does not play a role in the outcome of regular febrile cough episodes as observed in the cohort studied here.

Keywords: Acute respiratory infection, Hajj, La Mecca, pilgrim, Statin

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Introduction

Each year, approximately 2000 Muslims travel from Marseille to participate in the Hajj, gathering with over two million pilgrims from all over the world. Health risks during the Hajj are a critical issue due to the extreme congestion of people [1]. Infectious diseases represent a major problem during the pilgrimage with acute respiratory infections (ARI) as the most common cause of admission to hospital [2–4]. Hajj pilgrims during their 1-month stay in Saudi Arabia experience relatively homogeneous accommodation conditions, and

undertake identical rituals, while retracing the footsteps of the Prophet Mohammed, thus being very likely exposed to the same risk of ARI. In recent years, several non-randomized studies have linked statin use with decreased risk of severe sepsis or death from severe infections, including pneumonia [5–7]. Recent prospective cohort studies confirmed previous observations [8–12] while another suggested that the apparent beneficial effect of statins probably reflected a 'healthy user' effect, as statin users appeared to be younger, healthier, better educated, and socially and economically more privileged compared to non-statin users [13]. These controversial findings also raised questions about the potential role of statins in the prophylaxis of infectious diseases such as pandemic influenza [14]. Muslims departing from Marseille to participate in the Hajj have been found to have a median age of 61 years, with more than one third being over 64 years old [15], and are therefore likely to use

statins in a significant proportion. We conducted a prospective epidemiological study to evaluate the incidence of febrile cough episodes among Hajj pilgrims from Marseille and to assess if statin use could have an influence on this incidence. The socio-economic situation and health characteristics of the travellers were not consistent with the hypothesis of a 'healthy user' effect.

Materials and Methods

Study population

A prospective cohort study was carried out in the Marseille Travel Medicine Centre (Hôpital Nord) from 4 November to 8 December 2006. Participants in the survey were pilgrims in preparation for the Hajj pilgrimage enrolled in the meningococcal vaccination campaign to satisfy compulsory vaccination requirements. Pilgrims older than 18 years were included on a voluntary basis and participants were asked to give written consent. Pre-travel questionnaires were presented orally, before vaccination, in French, in Arabic or in French and Arabic, depending on the language fluency level of the participants. Post-travel questionnaires were presented by telephone.

Questionnaires

The pre-travel questionnaire included demographic factors (age, gender, location of residence), indicators of immigration status (country of birth and duration of stay in France), socio-economic indicators (level of education, employment, type of housing, rooms per person and household, complementary health insurance modalities), health status indicators (diabetes, hypertension, chronic respiratory diseases, statin use, vaccination coverage against influenza) and number of previous travels to Saudi Arabia.

The post-travel questionnaire included travel indicators (duration of stay, food and housing conditions) and data about travel-associated diseases (medical consultation, hospitalization, occurrence of cough with or without fever, time of manifestation and duration of symptoms). Cough was defined as occurrence of cough with or without sputum in an individual without chronic cough and subjective aggravation of cough in individuals suffering from chronic respiratory diseases. Fever was defined as subjective feeling of fever. Pilgrims were considered as lost in follow up after three failed attempts to reach them by phone.

Analysis

Data were recorded anonymously in a Microsoft Access database and transferred to EPIINFO 6.0 software (CDC,

Atlanta, GA, USA) for univariate statistic analysis. Differences in proportions were evaluated using the chi-square test. As selection procedure, a two-tailed p value ≤ 0.25 was considered as significant [16]. Multivariate analysis was performed using the SPSS version 15 software program (SPSS, Inc., Chicago, IL, USA). Factors with a p value < 0.25 in univariate models were included in a multivariate model, as suggested in the classical work of Mickey and Greenland [16]. Sex, age and statin use were also included in the model. A stepwise procedure based on likelihood ratio criteria was used in order to obtain the best criteria with the lowest Akaike criteria (AIC) [17–19]. For the final model, a two-tailed p value ≤ 0.05 was considered as significant.

Results

Among 650 vaccinees preparing for the Hajj pilgrimage, 580 voluntarily participated in the study, yielding a response rate of 89.2%.

Respondents had an average age of 58 years (range 20–85 years) with a sex ratio (M/F) of 1.32 (Table 1). A total of 217 travellers were living in Marseille (37.4%), 357 in other parts of southern France (61.6%); information was not available in six cases (1.0%). Most of the pilgrims were born outside of France, with 88.8% having been born in North Africa. The mean duration of stay in France was 32 years (range 0–72 years). A proportion of 83.1% of travellers had a primary school education or below. Thirty-four per cent of individuals were retired.

Among those under 65 years which is the age of retirement in France, only 10.9% were employed. A proportion of 47.1% was living in state-subsidized housing and 49% received state subsidies for payment of rent. Only 19.8% were property owners. Among 41.2% of individuals, the household allocation was less than one room per person. A proportion of 26.6% of travellers was covered by the state-financed complementary health insurance which is accessible to insolvent individuals and 45.2% had a self-financed private complementary health insurance.

A proportion of 7.4% were covered under the state-financed full health insurance coverage in cases of chronic and debilitating disease. Forty-three per cent of the pilgrims declared to suffer from chronic diseases, including 22.8% suffering from diabetes, 25.3% from hypertension and 4.0% from chronic respiratory disease. A proportion of 10.3% was treated with statin for hypercholesterolaemia. A proportion of 34.3% of travellers reported to have been vaccinated against influenza in 2006. A total of 414 individuals (71.4%) had never travelled to Saudi Arabia, 89 (15.3%) had made a

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