Acute Respiratory Infections in Hajj Pilgrims

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Abstract The Hajj pilgrimage brings millions of Muslims together from various countries, creating a high-risk environment for the spread of infectious diseases, particularly acute respiratory infections (ARI). This study examines ARI risk factors among pilgrims, focusing on a case study at the Surabaya Hajj Dormitory during the 2024 disembarkation period. Data were gathered through temperature checks, swab tests, and assessments of pilgrims showing fever and respiratory symptoms. The results indicate a high prevalence of ARI symptoms among pilgrims, with key risk factors including advanced age, pre-existing health conditions, and high crowd density during rituals. Routine identification and monitoring throughout the disembarkation process can help reduce transmission risks and improve health outcomes for pilgrims. Compliance with mask-wearing, especially among elderly, remains low despite health education efforts. Therefore, preventive measures such as mask distribution and vaccination need to be reinforced to minimize infection risks during Hajj, one of the world's largest mass gatherings. The government is encouraged to provide adequate healthcare facilities against the spread of infectious diseases.

Keywords Hajj pilgrims; acute respiratory infections; aviation health; preventive; transmission risk

1. Introduction

Hajj is the pilgrimage to Mecca and its surrounding sacred sites. In Islam, every Muslim who is physically and financially able must perform Hajj at least once in their lifetime. During Hajj, millions of Muslims retrace the steps of Prophet Muhammad, engaging in a series of traditional rituals. Hajj occurs during the 12th month of the Islamic lunar calendar. Upon reaching Mecca, each pilgrim completes seven circumambulations around the Kaaba (a structure considered the House of God by Muslims). Pilgrims then proceed to the Plain of Arafat, located a few miles east of Mecca, where the pilgrimage reaches its peak on the "Day of Arafat." Pilgrims also stop overnight in Mina on their way to Arafat and in Muzdalifah on their return journey (1).

In 2024, Indonesia had the largest Hajj quota, with 241,000 pilgrims, of whom 213,320 were regular pilgrims and 27,680 were special-category pilgrims. The age distribution of Indonesian pilgrims in previous years shows that the majority were between 51-60 years old, accounting for about 35.66%, followed by the 41-50 age group at 26.3%.

Acute respiratory infections (ARI) are the leading cause of infectious illness among pilgrims, with symptoms reported in 50-93% of cases. Recent studies reveal that the most commonly detected respiratory virus among Hajj pilgrims is the human rhinovirus (HRV), followed by human coronaviruses (HCoV) and influenza virus A (IAV). Human rhinovirus (HRV) accounted for the majority of cases, with 53 reported instances (42.06%), followed by 27 cases of influenza A (H1N1) (21.43%) and 23 cases of other influenza A strains (18.25%). Coronavirus cases included 25 cases of CoV-229E (19.84%), with fewer cases of other strains: five CoV-OC43 (3.97%), four CoV-HKU1 (3.17%), and one CoV-NL63 (0.79%) (3). Most cases were associated with pilgrims over 60 years old. The higher susceptibility of elderly pilgrims to infections may result from a less efficient immune response, compounded by factors like chronic illnesses and physical and mental stress. Environmental factors, such as close contact during religious rituals and extreme crowd density, also heighten pilgrims' vulnerability to airborne pathogens (4).

Data from various studies indicate an extremely high prevalence of ARI symptoms among Hajj pilgrims. One study recorded that 93.4% of Malaysian pilgrims surveyed experienced respiratory symptoms during Hajj (5). The high prevalence of respiratory infections among Hajj pilgrims highlights the importance of preventive measures, such as vaccination, mask usage, good hygiene, and adequate nutrition, to control the spread of disease during this religious mass gathering (6). This case study aims to identify the clinical factors influencing ARI incidence among Hajj pilgrims.

2. Methods

This case report utilized an observational method focused on pilgrims with ARI. The study was conducted from June 17 to July 14, 2023, during the Surabaya Disembarkation at the Sukolilo Hajj Dormitory in Surabaya. The procedures included several stages: 1) Monitoring the body temperature of arriving pilgrims using a thermal scanner at the entrance hall; 2) Pilgrims detected with a temperature ≥38°C were confirmed using a thermogun and, if confirmed to have a fever, underwent a COVID-19 antigen swab test; and 3) Patients were referred to the clinic for observation and further examination.

3. Case Description

Mrs. UK, 60 years old from SUB-8 Lamongan batch, was taken to the Hajj clinic with complaints of coughing since 1 day ago. Continuous cough with phlegm accompanied by a runny nose. She also had fever with dizziness since that morning. The predominant cough started while still on the plane

and fever began to be detected during transit before heading to Indonesia. She has hypertension but never takes medication. There is no history of other illnesses or hospitalization during the Hajj. Medical team on her batch said she rarely used a mask during the Hajj and on the plane because she like couldn't breathe.

The general physical examination in ambulance before arriving at the clinic shown blood pressure 158/92 mmHg, pulse 118 beats/min, temperature 38.3°c, respiratory rate 24 breaths/min, oxygen saturation 90% on room air, 92% with 2 liters/min nasal oxygen. There were no pathological signs in the lungs such as crackles, wheezing or retractions. She was diagnosed with fever suspected pneumonia.

The doctor on clinic provided treatment with nasal cannula oxygenation 4 liters/min, Ringer's solution, 500cc loading dose, ondansetron 4 mg, ranitidine 50 mg, and metamizole 500 mg by intravenous. The doctor also gave nebulized Salbutamol 2.5 mg/1 repulse. Further examinations carried out were the COVID-19 antigen swab test and PCR. The patient will be referred to her local hospital in Lamongan for further examination, including chest X-ray and additional lab tests. Health workers from the referral hospital will periodically monitor her condition and provide oxygenation with a portable oxygen tank during the referral process.

4. Results and Discussion

Hajj pilgrims represent a group of people traveling from outside Indonesia to participate in one of the world's largest mass gatherings. According to the World Health Organization, a mass gathering is defined as a concentration of people at a specific location for a specific purpose over a set period, which can potentially burden local resources. Mass gatherings can be categorized into three main types: social events (such as concerts and festivals), sports events (such as the FIFA World Cup and the Olympics), and religious events (such as Kumbh Mela and Hajj). Mass gatherings can lead to fatigue, particularly among the elderly, and also create the potential for major outbreaks in the event location, facilitating the global spread of infectious pathogens.

Hajj is one of the largest mass gatherings worldwide, drawing over two million pilgrims annually from around the globe. The risk of respiratory virus transmission is extremely high due to the density of people gathered in crowded holy places, such as during the circumambulation of the Kaaba or in the pilgrims' accommodations in the holy land (4,7).

The Hajj pilgrimage requires significant physical endurance and strength to complete. This year, a large number of pilgrims in Surabaya's Hajj Dormitory were diagnosed with ARI. Last year, around 150,000 cases of ARI were reported among pilgrims in Saudi Arabia, identified in both outpatient and inpatient settings within the Hajj clusters, sectors, and Hajj Health Centers. In the previous year, respiratory system illnesses accounted for about 25% of the 428 deaths among Hajj pilgrims (3).

This study reports a pilgrim exhibiting ARI symptoms indicative of pneumonia. Initial screening was conducted by identifying sick pilgrims through reports from the Indonesian Hajj Health Workers and Hajj Organizing Committee of each cluster. Following this, Health Quarantine Center officers monitored the patient until they arrived at the clinic in the Hajj Dormitory for further evaluation. Other pilgrims arriving at the Hajj Dormitory underwent body temperature screening via thermal scanners to detect fevers in those with a temperature over 38°C. Pilgrims who exhibited fever were promptly transferred to the clinic. The clinic's doctor conducted diagnostic assessments and provided initial treatment for ill pilgrims. When necessary, doctors could refer pilgrims to the nearest hospital or their hometown for further treatment, as was the case with this patient (Figure 1).

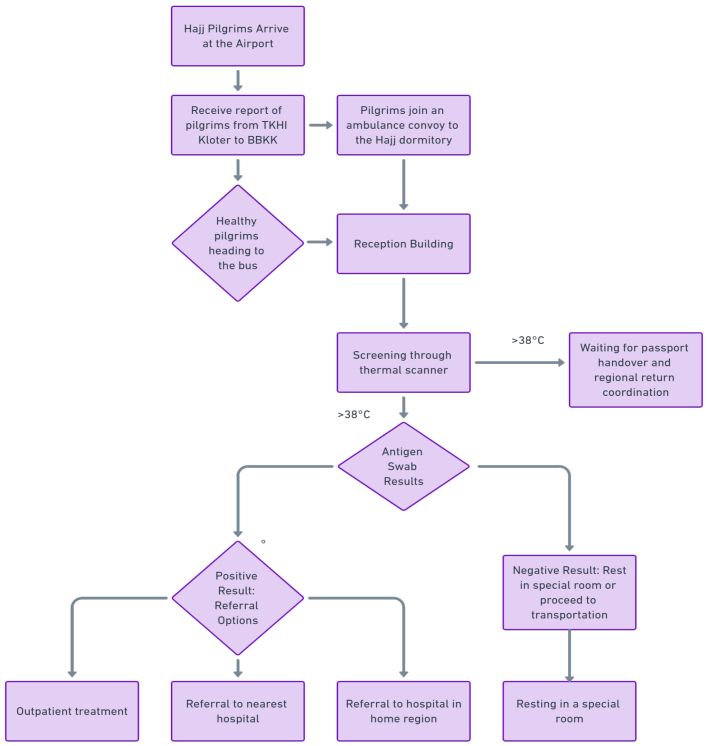

Figure 1. Flowchart for the Admission Process of Healthy and Sick Pilgrims during Disembarkation

The referral process for Hajj pilgrims in this case is appropriate. During the debarkation process at the Hajj dormitory, referrals can be made to the nearest hospital or regional hospital that has been officially selected by the Ministry of Religion. This provision is regulated by the Decree of the Minister of Health of the Republic of Indonesia Number 1061 of 2008. The service process at the clinic includes an initial examination and simple medical procedures. The clinic can refer to a designated hospital if it finds difficult cases that do not meet the clinic's competence. In emergency cases, the nearest hospital is the priority for referring sick pilgrims.

Research by Burase et al. (2016) highlighted that compliance with mask usage among Hajj pilgrims as a preventive measure for ARI remains low. Of the 163 respondents, only 37.4% wore masks, while the remaining respondents did not comply. A non-supportive attitude towards mask use

was observed in 61.3% of respondents, which increased their risk of ARI by up to three times. Despite health education efforts at the point of embarkation and the dissemination of information about the importance of mask usage, these efforts have not been entirely effective in improving compliance. Respondents who received information regarding mask usage demonstrated higher compliance; however, many continued to neglect mask-wearing upon arrival in Saudi Arabia. In conclusion, despite efforts in health education and information dissemination, non-supportive attitudes and ingrained habits remain significant barriers to improving mask compliance among Hajj pilgrims (8).

5. Conclusion

The predominantly elderly Hajj population with comorbidities faces a heightened risk of infection during the pilgrimage. Additionally, mass gatherings can trigger large outbreaks locally and facilitate the global spread of infectious pathogens. Therefore, upon the return of Hajj pilgrims to Indonesia, thorough health screenings are essential to prevent health complications among returning pilgrims. Referral systems that follow guidelines such as in this case can be developed again to be better. Providing respiratory-related vaccinations and masks is a critical preventive measure that the government should prioritize. Allocating a portion of the Hajj funds towards preventing morbidity and mortality during the pilgrimage would be beneficial.

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