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# VIRAL PATTERN OF RESPIRATORY DISEASES AMONG PILGRIMS OF HAJJ, SYSTEMATIC REVIEW

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**Abstract:**

*The respiratory system infections have been one of the biggest problems for the pilgrims and the medical organizations of hajj in the recent years. Viral agents play an important role in these diseases; more than 200 viral agents can cause infection in the respiratory system. This research aimed to study of viral pattern of respiratory diseases among pilgrims of hajj- Mecca. A comprehensive review of all studies conducted on respiratory diseases among Hajj pilgrims from 2000 to 2017 was carried out using Pub Med, Science Direct and Google scholar and web of science websites. This study indicated that Influenza and parainfluenza virus, Rhinovirus, Corona viruses and Respiratory Syncytial Virus is most common viruses among pilgrims. Corona viruses were first detected in 2011 on Hajj pilgrims with a prevalence rate of 8.3 percent According to the results and an average of about 30-40% of respiratory diseases among pilgrims, careful planning must be done to prevent this disease. It is suggested pay special attention to vaccination of pilgrims and treatment of patients before departure as well as continuous use of masks during the pilgrimage ceremony.*

**Key words:** *Viral Respiratory, Viral Pattern, Pilgrims, Hajj*

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## INTRODUCTION:

The great annual gathering of Muslims from all over the world in Mecca and Medina for doing the religious rites of hajj is the biggest religious ceremony in the world. Every year, 1.9 million people from 140 countries and 100 thousand from Iran travel to Saudi Arabia for the hajj ceremony. The respiratory system infections have been one of the biggest problems for the pilgrims and the medical organizations of hajj in the recent years. Taking appropriate action for the prevention and control of these symptoms is a necessity in the planning management of hajj [1-3]. High population density and inevitable contacts during the hajj rituals and stay provide suitable opportunity for the outbreak and expansion of contagious diseases. Quasi-influenza respiratory symptoms are the commonest complaint that the pilgrims have in the fall and winter and the second common in the summer after cardiovascular diseases [4-6]. In spite of the health care provided by Saudi Arabia and the companion medical boards of the countries participating in hajj, more than half of the pilgrims catch respiratory diseases [7, 8]. Viral agents play an important role in these diseases; more than 200 viral agents can cause infection in the respiratory system. However, the influenza virus, human respiratory syncytial virus, parainfluenza virus and adenoviruses are active among the pilgrims of hajj [9, 10]. According to the reports of the companion medical board of the Islamic Republic of Iran, 35 to 80 percent of the Iranian pilgrims of hajj catch respiratory diseases every year. These symptoms are generally seen in various forms; sometimes, one person may be inflicted several times with several kinds of different symptoms. These symptoms are commonly seen in the forms of common cold, influenza-like illness, pharynges-conjunctive fever, sinobronchitis and mixed symptoms [11, 12]. In 2005, of almost 100 thousand Iranian pilgrims who participated in hajj, almost 80 percent were inflicted with respiratory diseases while 90 percent of them had been vaccinated against influenza [13, 14]. According to research, the efficiency of the influenza vaccine among the pilgrims of hajj is different and is reported to be 16 to 77 percent [15-17]. The purpose of this study has been to investigate the viral pattern of respiratory diseases common among the hajj pilgrims of various countries.

## METHODS:

A comprehensive review of all studies conducted on respiratory diseases among Hajj pilgrims from 2000 to 2017 was carried out using PubMed, Science Direct and Google scholar and web of science websites, resulting in the collection of 76 articles. Twenty-nine of these articles were not related to the topic; six were made in previous years but published during the above mentioned period. Ultimately, 41 articles were reviewed, though only 9 of these articles conducted a diagnostic review of viruses. After reviewing the studies, the necessary analyses were carried out.

### Respiratory Infections

Respiratory infections play an important role in adult mortality [18, 19] due to their rapid spread, so that 4.5% child deaths are reported annually due to respiratory infections [20, 21]. This is an important issue, which is always highlighted by the World Health Organization [22]. Since the potential for transmission of diseases increases during the Hajj season and the issue becomes more emphasized compared with the other occasions, it is important to consider all aspects in order to reduce the risk of transmission.

### Viral Respiratory Diseases

Viruses are the most important causes of respiratory diseases. They can involve the upper and lower respiratory tracts. Some respiratory infections may have originated from bacteria, but their prevalence is much lower than viral respiratory infections. Influenza viruses are among the most common and the most significant causes of respiratory infections [23, 24]. Based on previous studies on respiratory viruses, only influenza and measles viruses had been identified as respiratory viruses up to 1960. However, further studies led to the discovery of other respiratory viruses including rhinoviruses, coronaviruses, adenoviruses, parainfluenza viruses, and respiratory syncytial viruses. In addition to the noted viruses, metapneumovirus, HSV, Boca virus, and par echovirus caused respiratory diseases in Hajj pilgrims in the present study. Respiratory viruses which can be transmitted via respiration can transfer diseases in a very short time. The present study revealed a difference in the dispersion of viruses in various regions. As the carriers of different viruses, pilgrims from various countries aggregate in small, crowded areas, transmitting viruses to one another [25, 26 and 27]. Viral infections can be predisposing factors for secondary infections, as evidenced by the 1918 influenza pandemic which killed 40-50 million people [28]. It is of advantage to summarize the numerous studies conducted worldwide. From among the viruses responsible for respiratory problems, only a few had major pathogenic roles among the pilgrims. The most important of these viruses are discussed below.

### Influenza and Para Influenza Virus

The influenza virus is an RNA virus belonging to the family Orthomyxoviridae which has afflicted humans since ancient times [29]. Moreover, parainfluenza viruses are viruses with single-strand

RNAs belonging to the family Paramyxoviridae [30]. These two viruses are present in almost all the studies. Results of studies prior to 2008 indicate that the highest virus infection belongs to influenza virus which had the highest level in all the studies. Parainfluenza viruses are also observed in the studies, albeit with a smaller percentage (Table 1).

**Rhinovirus:**

The common cold is an upper respiratory tract infection that is easily communicated. Rhinoviruses are its most common cause: in 30 to 80 percent of the cases they are its causative agent [31]. Rhinoviruses belong to the Picornaviridae viral family and include 99 recognized types. One of the important points in the present research is that all studies carried out since 2011 have shown very high prevalence rates of rhinoviruses among Hajj pilgrims, and this has also been completely evident in research carried out since then. These viruses have been detected in almost all studies but at various prevalence rates (Table 1).

**Respiratory Syncytial Virus**

RSV is a sheathed-virus of the Paramyxoviridae family with single-stranded genomic RNA. Two different subtypes of RSV (the A and B subtypes) have been identified [32]. TSV has been present among the isolated viruses in all studies carried out on the common cold (Table 1).

**Corona viruses**

Coronaviruses are of the Coronoviridare viral family, a large family of viruses that includes various viruses from those of the common cold to viruses that are the causative agents of SARS [33]. Another of the very important results is related to Coronaviruses. These viruses were first detected in a study Ziad A. Memish conducted in 2011 on Hajj pilgrims with a prevalence rate of 83 percent. They were not among the viruses reported in 2012, but in the research Ziad A. Memish carried out in 2013 on Hajj pilgrims it was detected again with the prevalence rate of 12.1 percent. Considering its mechanism of action, pathogenicity, and the mortality rate it causes, necessary arrangements must be made to control this virus and prevent it from becoming epidemic (Table 1).

**Table 1: Pattern of viruses in respiratory diseases in different study**

| Authors | Country | Year | N | % | Influenza | Para INF | Rino V | Adeno V | Entro V | HSV | RSV | Meta Pen | Crona V | Human Boca V | Parechovirus |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hana [34]** | **All of world** | 2004 | 500 | 10.8 | 30 | 4 | - | - | - | 13 | 7 | - | - | - | - |
| **H.Rashid [35]** | **British** | 2005 | 205 | 18 | 27 | - | - | - | - | - | 10 | - | - | - | - |
| **Alboezi [36]** | **Iran** | 2006 | 255 | 32.5 | 25 | 19 | 15 | 14 | 5 | - | 4 | - | - | - | - |
| **H.Rashid [37]** | **Uk** | 2088 | 150 | 25 | 15 | 1 | 19 | - | - | - | 1 | - | - | - | - |
| **H.Rashid [37]** | **Saudi Arabia** | 2008 | 110 | 13 | 10 | - | 3 | - | - | - | - | - | - | - | - |
| **Ziad A. Memish [38]** | **All of world** | 2011 | 3218 | 14.5 | 13 | 1 | 414 | 1 | - | - | 8 | 3 | 27 | 1 | - |
| **Samir [39]** | **French** | 2012 | 165 | 38 | 7 | 1 | 19 | 1 | 1 | - | 1 | 1 | - | - | - |
| **Osamah [40]** | **Qatar – Australia** | 2013 | 112 | 38 | 5 | 3 | 28 | 2 | - | - | - | - | 2 | - | - |
| **Memish ZA [41]** | **All of world** | 2013 | 1206 | 38 | 30 | 4 | 253 | 4 | 8 | - | 9 | 1 | 147 | 1 | 1 |

## CONCLUSION:

This study is a review of previous studies about viral pattern of respiratory diseases among pilgrims of Hajj. Previous studies reported the main viruses causing respiratory problems were the influenza viruses, syncytial viruses, the parainfluenza viruses, and the adenoviruses, but the present research contradicts those results. According to the results and an average of about 30-40% of respiratory diseases among pilgrims, careful planning must be done to prevent this disease. It is suggested pay special attention to vaccination of pilgrims and treatment of patients before departure as well as continuous use of masks during the pilgrimage ceremony.

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