

Comparison of mortality and morbidity rates among Iranian pilgrims in Hajj 2004 and 2005

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ABSTRACT

Objectives: We compared the incidence of common diseases and accidents among Iranian pilgrims during Hajj 2004 and 2005, and determined the factors affecting the prevalence of each disease.

Methods: We conducted this comparative study on 30037 Iranian pilgrims during Hajj 2004 and 75676 pilgrims during Hajj 2005, in Mecca and Medina in the Kingdom of Saudi Arabia. In this study, 23 types of common illnesses, 8 types of accidents, some important demographic variables, and some probable related factors were investigated. Two-sample tests of proportions in STATA Statistical Software version 8 was used for the data analysis.

Results. The most common diseases during the 2 journeys were respiratory diseases and the incidence of these diseases in Hajj 2005 was twice more in the year 2004. The prevalence of cardiovascular diseases among pilgrims in Hajj 2005 was 142 per 10,000 and it was significantly lower than in Hajj

2004 (288 per 10,000). There was no significant difference among gastrointestinal, gynecological, psychological, and other important diseases, in the 2 journeys. Among the 8 types of accidents, the incidence of head and eye injuries during Ramy (one of the components of Hajj rites) in the year 2005, was significantly lower in 2004 (22 per 10,000 against 125 per 10,000). Furthermore, the mortality rate in the year 2005 with 24 deaths per 100000, was significantly lower than the deaths in 2004 (47 per 100000).

Conclusion. The findings of this study may guide the Hajj managers to estimate the needs of drugs, equipment, manpower, and educational needs for the pilgrims, also to identify and eliminate casual factors of diseases and accidents.

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Hajj, the journey to the sacred Mosque in Mecca, is a once in a lifetime obligation for all Muslims who are physically, psychologically and financially capable. Every year, more than 2 million people globally, including approximately 100000 Iranian, take part in the Hajj ceremony in Saudi Arabia.^{1,2}

People from all over the world are confronted with some kinds of diseases. Many factors may make pilgrims more vulnerable to diseases due to unavoidable over crowding and closeness, change of

daily lifestyle, change of dietary habit, change of area weather, change of personal habits, nostalgic stresses, and some other psychological stresses, fatigue, and lack of sleep from the physically demanding regimen of Hajj rites, as well as the over-enthusiastic exertions in Salah and devotions, and strenuous physical efforts for performing the Hajj rites. All of these factors decrease one's immunity and resistance.^{2,3} Due to the above factors, pilgrims are face with some diseases

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such as respiratory infections,^{4,5} meningococcal diseases,⁶ exacerbation of bronchial asthma and chronic obstructive pulmonary disease (COPD),⁵ gastroenteritis and food poisoning, hepatitis A, B and C and various zoonotic diseases,⁷⁻¹¹ and some other kinds of injuries such as motor vehicle accidents, fire burn injuries and accidental hand and eye injuries,⁷⁻⁹ heat exhaustion and heatstroke³ or exacerbation of previous cardiovascular diseases.¹⁰ Clarification of the distribution of diseases among pilgrims and investigating the related factors, prepares a good guide for the health managers in Hajj, to promote their own plans.

Table 1 - List of the necessary examinations for pilgrims in Hajj 2004 and 2005 before departure.

Age	Necessary examinations
<50 years old males	Clinical examination only
<50 years old females	CE + Gravindex test
50-60 years old pilgrims	CE + CBC/diff, FBS, BUN, Creatinine, U/A, ECG, chest x-ray
>60 years old pilgrims	CE by cardiologist + above lab exams + exercise test
CE - clinical examination, CBC - complete blood count, FBS -fetal bovine serum, BUN - blood nitrogen urea, ECG - electrocardiogram	

In this study, we determined the abundance, and distribution of diseases and accidents among Iranian pilgrims during Hajj 2004 and 2005, and compare these 2 years with each other.

Methods. This comparative study was conducted on 30037 Iranian pilgrims in Hajj 2004 and 75676 pilgrims in Hajj 2005, in Mecca and Medina in the Kingdom of Saudi Arabia. All of these pilgrims were examined clinically and para clinically on the basis of following directions prior to departure (**Table1**). During these 2 journeys, a total of 600 groups of physicians discovered and recorded all of the diseases and accidents in a pre-designed questionnaire. At the end of the journeys, data delivered via completed questionnaires to surveillance system supervisors.

In this study, we have defined some exact operational definitions for 23 types of current diseases, 8 types of accidents, and some important demographic variables. All of the physicians were accounted for the quality of completion of the research questionnaire.

The response rate, in this study, was approximately 57% (105713 out of 185000 pilgrims). The collected data sets summarized into tables and different rates calculated and reported by different denominators for justification of the rates. For estimating the amount of chance error in each comparison, and due to the large samples studied, 2- sample test of proportions in STATA statistical program version 8 was used.

Table 2 - Some important demographic data from understudied Iranian pilgrims in Hajj 2004 and 2005.

Variables	2004 (1382 h)		2005 (1383 h)		Significance of the difference (p-value)
	N	Rate (%)	N	Rate (%)	
Total number of reported pilgrims	30037	---	75676	---	---
Average of the age (years)	53.5	---	52.5	---	---
Gender distribution					
Female	13312	(44.3)	37081	(49)	<0.0001**
Male	16413	(54.7)	38595	(51)	
The rate of high risk pilgrims*	7686	(25.6)	9989	(13.2)	<0.0001**
Meningococcal vaccination rate (vaccination required population)***	29976	(99.8)	74767	(98.8)	<0.0001**
Influenza vaccination rate	22257	(74.1)	66821	(88.3)	<0.0001**
Pneumococcal vaccination rate	750	(2.5)	6735	(8.9)	<0.0001**
Respiratory involvement incidence (the most common disease)	10561	(35.2)	52973	(70)	<0.0001**
Total frequency of accidents	898	299/10,000	1671	221/10,000	<0.0001**
Hospitalization rate	360	120/10,000	999	132/10,000	>0.11
Mortality rate	14	47/100,000	18	24/100,000	<0.028**
*The high risk pilgrims in this study were patients suffering from diabetes mellitus, hypertension, core pulmonale cardiovascular diseases, plegic pilgrims, and pilgrims over 65 years old age.					
**Statistically significant difference under level of 0.05, 2 sample test of proportions.					
***The rates indicated percentage of pilgrims in each journey required and received vaccination. All non-immune pilgrims in each journey received appropriate vaccination.					

Table 3 - Incidence of different kinds of respiratory diseases among Iranian pilgrims in Hajj 2004 and 2005 separately.

Type of the diseases	2004 (1382 h)		2005 (1383 h)		Significance of the difference (p-value)
	N	Incidence rate (%)	N	Incidence rate (%)	
Respiratory involvement	10561	(35)	52973	(70)	$p<0.0001^{**}$
Common cold	*	*	38468	(50.8)	---
Influenza like illness	*	*	14836	(19.6)	---
Allergic Syndrome	*	*	23717	(31.3)	---
Bacterial pharyngitis	2919	(9.7)	5965	(7.9)	$p<0.0001^{**}$
Sinusitis and reappearance of previous sinusitis or Sino bronchitis	2001	(6.7)	7269	(9.9)	$p<0.0001^{**}$
Pneumonia	73	24 per 10,000	255	34 per 10,000	$p<0.014^{**}$
Asthma and COPD	471	157 per 10,000	1123	148 per 10,000	$p>0.31$
Total understudied population	30037		75676		---

COPD - chronic obstructive pulmonary disease. *Unreported in Hajj 2004
 ** Statistically significant difference under level of 0.05, 2 sample test of proportions.

Table 4 - The incidence of gastrointestinal diseases among pilgrims in Hajj 2004 and 2005.

Disease	2004 (1382 h)		2005 (1383 h)		Significance of the difference (p-value)
	N	Incidence per 10,000	N	Incidence per 10,000	
Gastritis	1560	519	3940	521	$p>0.93$
Constipation	*	*	4449	588	---
Noninvasive gastroenteritis	758	252	2000	264	$p>0.27$
Invasive gastroenteritis	54	18	86	11	$p<0.008^{**}$
Total number of understudied population	30037		75676		---

* Not reported in Hajj 2004.
 ** Statistically significant difference under level of 0.05, 2 sample test of proportions.

Table 5 - Prevalence of some important diseases among Iranian pilgrims in Hajj 2004 and 2005.

Disease	2004 (1382 h)		2005 (1383 h)		Significance of the difference (p-value)
	N	Incidence per 10,000	N	Incidence per 10,000	
Cardiovascular diseases	866	288	1075	142	$p<0.0001^{**}$
Hypertension	2519	839	5950	786	$p<0.0048^{**}$
Diabetes mellitus	733	244	2210	292	$p<0.0001^{**}$
Vaginal bleeding (among female population)	*	*	1362	376	---
Psychological diseases	*	*	402	53	---
Dementia	59	20	113	15	$p>0.08$
Musculoskeletal disorders	*	*	3478	460	---
Sunburn	*	*	3458	457	---
Stroke	*	*	29	4	---
Total reported population	30037		75676		---

* Unreported cases in Hajj 2004.
 ** Statistically significant difference under level of 0.05, 2 sample test of proportions.

Table 6 - Incidence of accidents among Iranian pilgrims in Hajj 2004 and 2005.

Accident	2004 (1382 h)		2005 (1383 h)		Significance of the difference (p-value)
	N	Incidence per 10,000	N	Incidence per 10,000	
Road accidents	24	8	72	10	>0.45
To fall from height	17	6	47	6	>0.74
To fall from electrical stairs	22	7	76	10	>0.19
To slip (sliding)	104	35	239	32	>0.43
Bone fracture with any cause	36	12	158	21	<0.0023**
Twisted ankle	183	61	531	70	>0.098
Burning with fire or hot water	138	46	384	51	>0.31
Head and eye trauma during Ramy	375	125	164	22	<0.0001**
Total number of accidents	899	299	1671	221	<0.0001**
Total reported population	30037		75676		

**Statistically significant difference under level of 0.05, 2 sample test of proportions.

Results. This study was conducted on 105713 Iranian pilgrims during Hajj 2004 and 2005. **Table 2** shows the distribution of each demographic variable according to each year.

The most common diseases during these 2 journeys were respiratory diseases, and the most common clinical form of the respiratory diseases was common cold. **Table 3** shows the incidence of different kinds of respiratory diseases among pilgrims. Gastrointestinal diseases usually are prevalent among the pilgrims (**Table 4**).

Table 5 shows the incidence of other important diseases among pilgrims during Hajj 2004 and 2005. Every year in Hajj ceremony, pilgrims encounter different forms of accidents. **Table 6** shows the incidence of accidents among Iranian pilgrims.

Discussion. The most common diseases during the 2 journeys were respiratory diseases. But nevertheless the suitable covering of influenza vaccination (88.8%), the incidence of respiratory diseases in Hajj 2005 was twice as much as Hajj 2004 ($p < 0.0001$). These findings suggest that perhaps another etiologic agent except influenza virus has been responsible for the disease occurrence. It seems that the nature of respiratory disease in Hajj 2005 was different from the disease recorded during Hajj 2004. In other words, in Hajj 2005, the duration of respiratory disease and its complications such as; pneumonia and sinobronchitis were more during

Hajj 2004. Hamkar et al¹² reported that the most common viruses, which was detected in Hajj 2005, were adenoviruses, furthermore, he reported a high incidence of influenza (21.5%), nevertheless the high vaccination rate.

The morality rate in Hajj 2004 was 47 per 100000, and in Hajj 2005 was 24 per 100000 ($p < 0.028$). Perhaps the declining of this important index was due to the following factors: 1. decreasing the rate of high-risk groups in 2005 (25.6% in 2004 against 13.2% in 2005), due to good screening of the pilgrims in 2005, before departure; 2. decreasing the rate of pilgrims suffering from cardiovascular diseases, from 288 per 10,000 in Hajj 2004 to 142 per 10,000 in Hajj 2005. This was also due to good screening of the pilgrims before departure, good coverage of vaccination against meningococcal infections (99%), influenza (99.5%), and against pneumococcal infections (67.4%) in high risk groups in Hajj 2005.²

After analysing the rates of "accidents", we found a 5 fold decrease of the rates of "head and eye trauma during Ramy" ($p < 0.0001$), and this perhaps was due to changing the structure of the jamarat (the places for Ramy) in Hajj 2005. In contrast, the rate of all cause fracture increased from hajj 2004 to hajj 2005 among Iranian pilgrims. This may be due to increased over crowding in Hajj 2005.

This study suggest that we should continue the vaccination against 3 of the above-mentioned vaccines, specially the flu vaccine for high risk

pilgrims and recommend emphatically on pilgrim's medical screening before departure to Saudi Arabia. And finally, the results of our study can help health managers during Hajj in estimating the needs of drugs, equipment, manpower, and education for the pilgrims in order to reduce or even eliminate diseases, accidents and death rates.

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