

Distribution of Medical Illnesses among Pakistani Hajj Pilgrims: Experience of the Pakistan Hajj Medical Mission during Hajj 2024

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Abstract

Background: Hajj pilgrimage, which takes place in Makkah, Kingdom of Saudi Arabia, is the largest mass gathering of Muslims. The diverse crowd with varying demographic profiles, immunity levels and disease exposure, creates an environment that facilitates the transmission of infectious diseases.

Objective: To observe the frequency, patterns and gender distribution of medical illnesses among Pakistani Hajj Pilgrims attending the medical facilities of the Pakistan Hajj Medical Mission during Hajj 2024.

Methods: This retrospective study was conducted at Pakistan Hajj Medical Mission (PHMM) hospitals /dispensaries in Makkah (Mission hospitals) and Medina from May to July 2024. All Pakistani Hajj pilgrims attending PHMM hospitals outpatients were included in study. Data collected using a specially designed proforma was analyzed.

Results A total of 168,884 patients received medical consultations at outpatient departments of these hospitals during the Hajj pilgrimage, with a male to female ratio of 60:40. A total of 81 deaths occurred during the 10-week Hajj pilgrimage period. Respiratory tract infections and musculoskeletal disorders were the most common illnesses (18%), with predominance among males. Primary causes of death were cardiorespiratory arrest secondary to complications of chronic diseases, road traffic accidents, and heat stroke. Old age, overexertion, and irregular use of medications further contributed to mortality.

Conclusion: During Hajj 2024, the PHMM observed a predominance of male patients with respiratory tract infections and musculoskeletal disorders being the most common ailments. Mortality also remained almost double among males as compared to females.

Key words: Pakistan hajj medical mission, hajj 2024, frequency, disease patterns.

Introduction

The World Health Organization defines mass gatherings as large groups of people who come together at a specific location for a shared

purpose, for a defined duration, and in numbers that may place a strain on local infrastructure and resources.¹ International events such as sporting competitions, religious pilgrimages, and festivals attract massive global crowds, bringing together people from different regions and countries. The diversity of these crowds, with varying demographic profiles, immunity levels and histories of disease exposure, creates an environment in which infectious diseases can spread easily.²

The Hajj pilgrimage, which takes place in Makkah, Saudi Arabia, is the largest and most significant mass gathering. It is aptly described as Islam's 'global gathering' fostering a sense of

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Authors Contribution

JAL conceptualized the project and did the data collection. HTS performed the statistical analysis. TA & QM did the literature search, drafting, revision & writing of manuscript.

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communal unity, shared values, and equality among the pilgrims. This gathering is attended by 2-3 million people hailing from more than 193 countries, with Pakistan ranking high among countries with the most pilgrims. As one of the five fundamental pillars of Islam, Hajj is a sacred obligation for all physically and financially able Muslims to undertake the pilgrimage.³⁻⁵ The timing of Hajj varies because it is based on the Islamic lunar calendar. Each year, the pilgrimage takes place in the 12th lunar month. Consequently, it occurs in different seasons **over** time, influencing the types of diseases that are more likely to occur.⁶

The Hajj rituals involve walking between sacred sites, resulting in considerable physical exhaustion. The majority of Hajj pilgrims are older adults, typically over 50 years of age, who often have multiple underlying health conditions, making them a vulnerable population. The confluence of factors such as overcrowding, fatigue, extreme temperatures and disturbances in fluid and electrolytes further contribute to the development of illness.^{7,8} Pilgrims remain in close proximity to one another for extended periods while performing specific religious rites in a prescribed manner, thereby increasing the risk of communicable disease transmission.⁹ Communicable health risks associated with Hajj include respiratory tract infections, gastroenteritis, meningococcal meningitis and acute viral hepatitis. In addition, Hajj poses several non-communicable health risks. One of the most significant hazards is the risk of stampedes. Road traffic accidents, fire-related burn injuries and accidental hand injuries sustained during slaughter of animals are additional concerns.¹⁰

Hajj pilgrims receive free medical services at designated healthcare facilities, while some countries also provide specialized health care through their own Hajj medical missions. Analysis of disease patterns during Hajj can identify healthcare system gaps, improve public health strategies and optimize resource allocation, thereby enhancing the quality of health care services provided to pilgrims.¹¹

The aim of this study is to determine the frequency, pattern and gender distribution of different medical illnesses among Pakistani Hajj Pilgrims attending medical facilities (dispensaries and hospitals) of PHMM during Hajj 2024 (1445 AH).

Methods

A retrospective study was conducted using data collected from Pakistan Hajj Medical Mission

hospitals and dispensaries in Makkah Mukkarmah (Mission hospitals) and Medina Munawara (KSA hospitals), from May to July 2024. The total staff deployed for the PHMM comprised 375 individuals, including 128 from the army and 247 from the civil health departments. The Kingdom of Saudi Arabia (KSA) and Mission hospitals were established to provide medical services to Pakistani Hajj pilgrims. One Mission hospital and two Dispensaries were established in Medina. One Mission hospital and eight Dispensaries were established in Makkah while one Dispensary in Jeddah was established to serve Pakistani pilgrims. Mission hospitals provided primary and secondary healthcare services, whereas KSA (Kingdom of Saudi Arabia) hospitals provided tertiary medical and surgical care. Pakistani pilgrims were covered by health insurance, enabling them to receive free treatment in KSA hospitals. The hospitals established for Pakistani Hajj pilgrims offered a range of medical facilities including laboratory services, X-ray, Ultrasound (USG), Electrocardiogram (ECG) and Dental care. All Pakistani Hajj pilgrims who reported to the Pakistan Hajj Medical Mission hospitals in Makkah and Medina were included in the study. Data collected using a specially designed proforma was analyzed using SPSS version 23.

Results

A total of 168,884 patients received medical consultations at the outpatient departments (OPDs) of these hospitals during the Hajj pilgrimage. The gender distribution of patients revealed a male-to-female ratio of 60:40. A total of 395 patients required hospitalization, with 247 admitted to KSA hospitals and 148 admitted to Pakistani Hajj Medical Mission hospitals. Moreover, 12,156 patients needed extended medical observation and were detained for medical attention including 7157 (59%) males and 4999 (41%) females. Mortality was observed in 81 patients during the 10-week Hajj pilgrimage period. Among these, 20 (24.69%) deaths occurred during the pre-Hajj period, whereas 61 (75.30%) lost their lives during the post-Hajj period. Analysis of the fatalities revealed that 36 (44%) deceased pilgrims belonged to the private Hajj scheme, while 45 (56%) belonged to the government Hajj scheme. The male-to-female mortality ratio was 19:17 in the private Hajj scheme and 33:12 in the government Hajj scheme. Highest number of deaths were recorded in Makkah (48 cases), followed by Medina (14 cases). The majority of deaths (29 cases; M:F

24:5) occurred among pilgrims older than 60 years who had pre-existing chronic conditions, including ischemic heart disease, diabetes mellitus, hypertension, chronic renal disease. Some patients were receiving regular dialysis, which was continued in KSA hospitals. The leading causes of death were

cardiorespiratory arrest secondary to complications of chronic diseases, road traffic accidents, and heat stroke with temperatures reaching as high as 51.8 °C. Old age, overexertion, and avoidance/irregular use of

Table 1: Characteristics of patients attending the OPDs of Pakistan Hajj Medical Mission Hospitals.

Parameter	n	Male	%	Female	%
No. of Patients	168,884	101520	60.00	67364	40.00
Total Admissions	395	213	53.92	182	46.07
Admissions at KSA hospitals	247	137	55.46	110	44.53
Admissions at Mission hospitals	148	76	51.35	72	48.64
Detentions (>3 hrs.)	12,156	7157	59.00	4999	41.00
Mortality	81	52	64.19	29	35.80

Table 2: Pattern of diseases among patients at Pakistan Hajj Medical Mission Hospitals.

Diseases	Acute Cases		Chronic Cases		Total		p-Value
	n	%	n	%	n	%	
Respiratory tract infection	30010	99.00	8	0.05	30018	18	<0.001
Musculoskeletal diseases	26587	87.21	3898	12.78	30485	18	<0.001
Gastrointestinal diseases	19311	9.83	31	0.16	19342	12	<0.001
Diabetes mellitus	00	00	18853	100	18853	11	<0.001
Fever unspecified	15463	100	00	00	15463	9	<0.001
Cardiovascular diseases	99	1.20	8095	98.79	8194	5	<0.001
Skin diseases	3310	34.74	6217	65.25	9527	6	<0.001
ENT	7434	98.97	77	1.02	7511	4	<0.001
Dental	783	16.01	4106	83.98	4889	3	<0.001
Genitourinary diseases	2235	80.51	541	19.48	2776	2	<0.001
Eye infections	3763	100	00	00	3763	2	<0.001
Gynae disorders	1743	9.60	16398	90.39	18141	1	<0.001
Neurological	233	9.86	2129	90.13	2362	1	<0.001
Miscellaneous	7456	90.18	739	9.01	8195	5	<0.001

medications further contributed to mortality. Majority of deaths occurred among pilgrims from Punjab province (40 cases). Mortality was higher among males (52 cases) (Table-1).

Table-2 shows the pattern of diseases observed among Pakistani Hajj pilgrims during the Hajj period. It was observed that the highest number of patients presented with respiratory tract infections and musculoskeletal disorders (18%), followed by gastrointestinal disorders (12%) and diabetes mellitus (11%). The possible determinants of these diseases included bacterial and viral infections, overexertion, high temperatures and chronic diseases.

Table-3 has shown the gender-wise distribution of diseases. The data indicate that males were predominantly affected by a wide range of health conditions, including respiratory tract infections, musculoskeletal disorders, diabetes mellitus, fever, cardiovascular diseases, skin disorders, ENT disorders, dental conditions, genitourinary and neurological disorders. Cases of accidental injuries necessitating surgical intervention were also reported predominantly among males. In contrast to the other conditions, gastrointestinal diseases were more common among female pilgrims.

Table 3: Gender distribution of diseases among Hajj Pilgrims.

Diseases	Total		Male		Female		p-Value
	n	%	n	%	n	%	
Respiratory tract infection	30018	18	18611	61.99	11407	38	0.15
Musculoskeletal diseases	30485	18	17729	58.15	12756	48.14	<0.001
Gastrointestinal diseases	19342	12	8016	41.44	11326	58.55	<0.001
Diabetes mellitus	18853	11	10838	57.48	8015	42.51	0.001
Fever unspecified	15463	9	8973	58.02	6490	41.97	0.005
Cardiovascular diseases	8194	5	4898	59.77	3296	40.22	0.82
Skin diseases	9527	6	6138	64.42	3389	35.57	<0.001
ENT disorders	7511	4	5270	70.16	2241	29.83	<0.001
Surgical/Injuries	5692	3	3753	65.93	1939	34.06	<0.001
Dental diseases	4889	3	3320	67.90	1569	32.09	<0.001

Genitourinary diseases	2776	2	1670	60.15	1106	39.84	0.86
Eye diseases	3763	2	2322	61.70	1441	38.29	0.03
Gynae disorders	1814	1	00	00	1814	100	-
Neurological	2362	1	1392	58.93	970	41.06	0.31
Miscellaneous	8195	5	5280	64.42	2915	35.57	<0.001

Discussion

In present study, a total of 168,884 patients received medical consultations at the outpatient departments (OPDs) of PHMM and KSA hospitals during Hajj 2024. In comparison, PHMM reported 184,496 outpatient visits by Pakistani Hajj pilgrims during Hajj 2016.¹¹ Analyzing the patients seeking medical care at OPDs of PHMM, males comprised 60% of the total, while females accounted for 40%. A similar gender distribution was seen in a study by Baksh *et al* during Hajj 2013 in which 55% were men and 45% were women.¹² However, the Pakistan Hajj Medical mission during 2016 reported a male- to- female ratio of 74.5:25.5.¹¹ The current study revealed the highest mortality was observed in Makkah (48 cases) followed by Medina (14 cases), which was comparable to findings from another study conducted in 2024 that also reported a substantially higher number of deaths in Makkah. This study included pilgrims hospitalized in Makkah and the surrounding sacred sites during the Hajj seasons from 2012 to 2017, with the exception of 2015.¹³ In contrast, Salmon *et al* reported the epidemiology of various infections occurring in Makkah during the Hajj through a literature review from 1852 to 2015.¹⁴

Present study indicated higher mortality among males than females, with the majority of deaths occurring in individuals aged over 60 years. The primary cause of death among pilgrims in this study was cardiorespiratory arrest, typically resulting from complications associated with chronic diseases. These findings were similar to those of another study conducted on Indonesian Hajj cohorts in Saudi Arabia between 2004-2011 which showed that approximately 70% of deaths occurred in males predominantly in individuals aged over 70 years, with circulatory and respiratory disorders being the two leading causes of death.¹⁵ These results were also consistent with another study conducted in 2023 in which men exhibited higher mortality rates, particularly those aged 60 and above. Meanwhile, Cardiovascular diseases accounted for 38.2% of deaths, followed by respiratory distress (29.5%). This study was a retrospective cohort study of Hajj pilgrims from East Java, Indonesia, conducted between 2017 to 2019.¹⁶

Regarding the disease patterns observed among patients at PHMM in the present study, respiratory tract infections (18%) and musculoskeletal diseases (18%) were the most common conditions. Another study conducted at Bangladeshi Hajj Medical Centre reported that the predominant health issue was respiratory tract infections, which comprised 41.2% of cases, whereas musculoskeletal problems represented a significantly lower proportion at 10%.¹⁷ Wasim Raja *et al* reported a comparatively higher frequency of respiratory tract infections (29%) during Hajj

2016 among Pakistani pilgrims.¹¹ However, according to Jabbar *et al* rheumatologic and orthopedic diseases were the dominant cause of hospital attendance making up 18.8% of the cases, whereas respiratory infections accounting for 8.3%. This study was based on Iraqi Hajj pilgrims during 2023.¹⁸

Considering the gender distribution of diseases among patients in current study, males accounted for 62% of respiratory tract infection cases, while the remaining 38% occurred in females. A similar gender disparity was observed in another study in which approximately 64% of males tested positive for one or more respiratory viruses. In this study, the researcher presented pattern of respiratory viruses among Pilgrims during 2019 Hajj Season who sought healthcare due to severe respiratory symptoms.¹⁹ Present study demonstrated that musculoskeletal disorders were more prevalent in males, whereas another study reported that female pilgrims were more frequently affected by musculoskeletal disorders during Hajj 2021. Furthermore, they reported a higher frequency of muscular disorders (80.46%).²⁰ More than half of the female patients (59%) in this study presented with gastrointestinal symptoms, corresponding to the findings of a study conducted on French pilgrims, which reported a positive correlation between female gender and gastrointestinal symptoms in a three-year prospective cohort. This study documented the incidence of enteric pathogens and identified risk factors for Hajj-associated diarrhea in Marseille-based pilgrims who attended the Hajj from 2016 to 2018.²¹ A study conducted on Iranian pilgrims during Hajj 2012-2022 revealed that diabetes mellitus was more common in females, which is contrary to the findings of present study.²² Comparable results regarding cardiovascular diseases were seen in an another study conducted on Iranian Hajj pilgrims from 2012-2022.²³ In current study, males were predominantly affected by skin diseases, whereas Sharaf *et al* reported no difference between the genders in this regard and concluded that ethnicity was the major determinant of dermatological disorders during the Hajj 2019.²⁴

Conclusion

During Hajj 2024, the Pakistan Hajj Medical Mission observed a predominance of male patients at hospital facilities. Most fatalities occurred in Makkah, followed by Medina, with pre-existing illnesses exacerbated by old age, over-exertion, and poor medication adherence. Cardiorespiratory arrest, heatstroke and road traffic accidents were the leading causes of mortality, particularly among males. Additionally, respiratory tract infections, musculoskeletal disorders, gastrointestinal issues, and diabetes were common

diseases observed, predominantly among males. Hence mortality also remained almost double among males as compared to females. The study highlights several areas for improvement to enhance the health and safety of Pakistani Hajj pilgrims. These include upgrading healthcare emergency services, particularly in Makkah and Medina, and implementing pre-travel health screening and education programs. Strategies aimed at preventing heatstroke and improving road safety should also be prioritized.

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Availability of Data: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval: The Institutional Review Board of Karachi Institute of Medical Sciences, Karachi approved the study via letter no. 12/24/IRB/KIMS, dated 20/08/2024.

Conflict of Interest: None declared.

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