

# Ethnicity is a major determinant of the pattern of dermatological diseases among pilgrims during the *Hajj* in 2019

Futoun Sharaf,<sup>1</sup> Marwa El-Samongy,<sup>2</sup> Nahla Bouqellah,<sup>3</sup>

Abdullah Al-Madani,<sup>4</sup> Mohammad Abu-Alruhaylah,<sup>5</sup> Yasir Ashour,<sup>6</sup> Najla Dar-Odeh,<sup>7,8</sup> Osama Abu Hammad<sup>7,8</sup>

<sup>1</sup>College of Medicine, Al-Rayan Colleges, Al Madina Al Munawara, Saudi Arabia;

<sup>2</sup>Faculty of Medicine, Tanta University, Tanta, Egypt; <sup>3</sup>College of Science, Taibah University, Al Madina Al

Munawara, Saudi Arabia; <sup>4</sup>Eradah Complex for Mental health, Al Madina Al

Munawara, Saudi Arabia; <sup>5</sup>King Fahad Hospital, Al Madina Al

Munawara, Saudi Arabia; <sup>6</sup>Al Madinah General Hospital, Al Madina Al

Munawara, Saudi Arabia; <sup>7</sup>College of Dentistry, Taibah University, Al Madina Al

Munawara, Saudi Arabia; <sup>8</sup>School of Dentistry, University of Jordan, Amman, Jordan

Jordan

## Abstract

The authors aim to explore the pattern and demographics of dermatological disorders occurring during Hajj 2019. Clinical records from three major public healthcare facilities in Al-Madinah Al-Munawara were retrieved for the period July-August, 2019. Collected data included age, gender, nationality, and dermatological complaints. 550 records were retrieved. Patients were 282 (51.3%) males and 268 (48.7%) females with a mean age of 58.3±12.6 years. Most patients were Asians (n=320, 58.2%), and Africans (n=183, 33.3%). Accidents (n=226, 41.1%), and infections (148, 26.9%) were the most common complaints. Asians and Africans had significantly: more accidents and less infections (P=0.002, P=0.027 respectively). They were the only category affected by exacerbations of auto immune diseases. Asian and African pilgrims are mainly affected by traumatic dermatologic conditions. Preventive awareness programs should target these ethnicities to reduce their higher rates of accidents. Other ethnicities need programs that promote hygienic practices and target infections.

## Introduction

Hajj (Pilgrimage) is one of the five obligatory religious rituals required from all Muslims if they have the physical and financial ability to meet its demands. The ritual takes place in certain parts of the city of Makkah during five specific days of the last month of the Hijri (Lunar) year. Under normal circumstances more than 2 million people of various ethnicities and different age groups practice this ritual in a characteristic mass gathering.<sup>1</sup> The enormous number of people gathering under harsh weather conditions is often associated with ensuing adverse health conditions and emergency situations particularly when crowding and lack of hygienic standards act as additional confounders.<sup>2</sup>

Various health problems may be encountered during Hajj season, posing major challenges to the healthcare system. Among these health problems, dermatologic conditions stand out as a poorly investigated category which necessitates further studies to clarify their nature and impact on the healthcare system. Skin diseases are a major cause of consultations in primary care.<sup>3</sup> They are the third most frequent disease category encountered in primary care among pilgrims next to respiratory and gastrointestinal diseases.<sup>4</sup> More recent studies report that they are the second most frequent disease category.<sup>5</sup> This may indicate that there is a changing trend in the epidemiology of skin diseases over the years favoring increased prevalence.

Studies investigating skin diseases among pilgrims are scarce and relatively old dating more than a decade ago.<sup>4,6</sup> Further, none investigated patients during other stages of Hajj season when many pilgrims opt to visit Al-Madinah which is the second most holy city in Islam, to pray in the second most holy mosque (Al Masjid Al Nabawi) and visit the tomb of Prophet Mohammad.<sup>7</sup> During this visit most pilgrims often feel worn out, due to fatigue and disturbed sleep associated with long distance travel which increases their susceptibility to various diseases. It is important to explore the recent trends in epidemiological aspects of skin diseases taking into consideration: its high frequency among pilgrims, anticipated impact on healthcare system and pilgrims' quality of life.

Therefore, we conducted this study to explore we conducted this study pattern and distribution of dermatologic conditions affecting pilgrims during their visit to Al-Madinah in Hajj season and investigate possible association with important demographic factors like age, gender and ethnicity.

Correspondence: Najla Dar-Odeh, College of Dentistry, Taibah University, Al Madina Al Munawara, 43353, Saudi Arabia, and School of Dentistry, University of Jordan, Amman 11942 Jordan.

Tel.: +96.6592231888.

E-mail: najla\_dar\_odeh@yahoo.com

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## Materials and Methods

Three major public healthcare facilities (two hospitals and one primary healthcare center) within Haram area (close to Al-Masjid Al-Nabawi) participated in the study during July-August, 2019. These facilities were allocated by the Ministry of Health for providing treatment to pilgrims. Clinical records of patients attending dermatology and emergency departments were included. All pilgrims with any skin condition that presented to any of these three centers were enrolled in this study. Records of patients who were residents in Al-Madinah were excluded as they were not pilgrims. Collected data included: age, gender, ethnicity, diagnosis of the dermatological condition, and its duration (onset) in days.

The research was conducted in complete accordance with the principles of the World Medical Association Declaration of Helsinki. Ethical approval was obtained

from Institutional Review Board, General Directorate of Health Affairs in Al-Madinah, reference #H-03-M-084.

### Statistical analysis

Data were coded and analyzed using IBM SPSS software for windows (SPSS version 21 software, Armonk, NY: IBM Corp). Descriptive statistics were conducted to describe frequencies and percentages. Chi-square test was used to estimate statistical significance of difference between groups of age, gender and ethnicity. Statistical significance was considered at  $P \leq 0.05$ .

### Results

A total of 550 clinical records were retrieved from the three healthcare facilities. Mean age of patients was:  $58.3 \pm 12.6$  years, age range was: 11-90 years. There were 282 (51.3%) males and 268 (48.7%) females. Patients were seen in these healthcare facilities within 1-28 days from the onset of the symptoms with a mean (SD) duration of: 2.24 (2.5) days. Most patients were from Asia and Africa, and they were distributed as follows: Asia ( $n=320$ , 58.2%), Africa ( $n=183$ , 33.3%), Europe ( $n=20$ , 3.6%), North America ( $n=12$ , 2.2%), South America ( $n=12$ , 2.2%) and Australia ( $n=2$ , 0.4%). The pilgrims were affected by different dermatologic conditions including accidents ( $n=226$ , 41.1%), infections ( $n=148$ , 26.9%), eczema ( $n=66$ , 12%), burns ( $n=54$ , 9.8%), allergies ( $n=30$ , 5.5%),

exacerbations of autoimmune diseases ( $n=26$ , 4.7%) as presented in Table 1.

Cross tabulation (Table 2) of gender and age groups ( $<60$  and  $\geq 60$  years) with various skin conditions did not show significant variations between elderly and the younger pilgrims nor between males and females regarding the occurrence of various conditions with  $P$  value  $> 0.05$ . However older age group was more prone to: infections (28%), autoimmune diseases (3.5%) and connective tissue diseases (2.1%).

Pilgrims were categorized into three ethnic categories based on their numbers: African, Asian, and others (North America, South America, Europe and Australia). African and Asian pilgrims had significantly: more accidents and less infections than other pilgrims ( $P=0.002$ , 0.027 respectively) (Table 3).

Regarding the time that elapsed from onset of signs and symptoms till the time the patients were seeking treatment, it was found that these conditions were of acute nature as 60.4% of patients presented for medical attention on the same day of the complaint, and more than 90% presented within 4 days.

### Discussion

Hajj could be associated with development of adverse health incidents like skin diseases; investigating which will help organize healthcare services so that neither pilgrims' spiritual activities are disturbed,

nor services of the healthcare system are jeopardized. Only few studies investigated the epidemiology of skin complaints among pilgrims,<sup>6,7</sup> which highlights the need for further and recent studies.

There were no significant differences between males and females in all categories of skin conditions, however, females showed a slight predilection for accidents and exacerbations of connective tissue diseases. While it is difficult to interpret the higher prevalence of accidents among females, higher prevalence of connective tissue disease exacerbations could be attributed to the established correlation between this category of diseases and the female gender, particularly for bullous diseases and SLE.<sup>8</sup>

Pilgrimage is highly competitive and governments give priority to older people, this explains why the mean age of patients stands high at: 58.3 years. Pilgrims from Asia and Africa were the most commonly affected ethnic groups with skin diseases. These diseases were mostly due to accidents. The vulnerability of other ethnic groups to accidents may be explained by differences in safety measures they practice. Asians constitute the largest proportion of pilgrims each year. The large numbers associated with overcrowding during the practice of Hajj rituals may pose health risks for the older and vulnerable age groups. Mass movements of pilgrims can increase susceptibility to accidents like falling, stampede, and traffic accidents, which may be aggravated by language and culture barriers.<sup>9</sup> It is

**Table 1. Types of skin diseases encountered in pilgrims.**

Accidents	Infections	Eczema	Burns	Allergies	AID exacerbations
- Skin cut wounds/abrasions	- Bacterial: pyoderma, abscesses, cellulitis, furuncles	- Contact dermatitis	- Sun exposure	- Drugs	- Pemphigus vulgaris
- Open fractures	- Viral: herpes labialis, zoster	- Atopic dermatitis	- Walking shoeless	- Insect bites	- Bullous pemphigoid
- Displaced nails	- Fungal: tinea cruris, tinea pedis, pityriasis versicolor	- Xerotic eczema, intertrigo	- Holding hot objects	- Food	- Psoriasis
		- March blisters	- Spills of hot water		- SLE
		- Dry lips and dry skin			

AID: Autoimmune diseases; SLE: Systemic lupus erythematosus.

**Table 2. Cross tabulation showing differences between genders and age groups for the various conditions and significance level.**

	Disease categories, number (%)						
	Accident	Burn	Infection	Allergy	Eczema	AID	CTD
Age groups							
<60 years	109 (41.8)	26 (10.0)	67 (25.7)	16 (6.1)	33 (12.6)	6 (2.3)	4 (1.5)
$\geq 60$ years	117 (40.5)	28 (9.7)	81 (28.0)	14 (4.8)	33 (11.4)	10 (3.5)	6 (2.1)
P value	0.761	0.507	0.914	0.659	0.534	0.418	0.634
Gender							
Female	119 (44.4)	12 (4.5)	22 (8.2)	29 (10.8)	71 (26.5)	8 (3.0)	7 (2.6)
Male	107 (37.9)	18 (6.4)	32 (11.3)	37 (13.1)	77 (27.3)	8 (2.8)	3 (1.1)
P value	0.124	0.325	0.216	0.407	0.830	0.918	0.174

AID: Autoimmune disease exacerbations; CTD: connective tissue disease exacerbations

not always possible to limit the numbers of pilgrims. Hajj season of 2020 was a very special case associated with corona virus disease-2019 (COVID-19), whereby very minimal numbers of pilgrims were allowed to perform Hajj to prevent spread of the virus. However, it was evident that limited numbers have allowed for the highly organized rituals mitigating the risk of developing accidents. Plans to organize the movement of pilgrims can take into consideration implementation of relevant legislations to mandate registration with organized campaigns and employment of easily readable multi-language signs for pilgrims to read and follow. It is also recommended to provide rest areas and different means of transport particularly for elderly pilgrims. Providing education on Hajj rituals and increasing awareness on proper behaviors in mass gatherings should be initiated in home countries before the start of Hajj journey.

Skin infections among pilgrims are one of the most commonly reported skin problems.<sup>10</sup> This might be due to: overcrowding, heat, humidity, and insufficient hygienic practices which all contribute to compromised immunity and opportunistic infections. Viral herpetic infections were common among pilgrims being associated with extremes of age, and weakened immunity arising from fatigue, lack of sleep, and stressful conditions. Adverse environmental conditions that are common during pilgrim-

age like: heat, sun exposure, thirst, crowding, traffic congestions and language barriers all represent major sources of stress.<sup>11</sup> Patients who have recurrent episodes of oral herpes infections and who are expected to travel to sunny areas, can be advised to use a short oral course of acyclovir or famciclovir to suppress viral activation.<sup>12</sup> On the other hand, zoster should be identified and treated within the first 72 hours of infection to prevent the debilitating complication of post-herpetic neuralgia. A highly effective vaccine is available against this infection, and it is usually administered to susceptible patients in two doses separated by two to six months.<sup>13</sup>

Bacterial infections also affected pilgrims such as pyoderma.<sup>10</sup> The predisposing factors include poor hygiene, trauma and overcrowding which allow easy spread of pathogens. It is important to address these predisposing factors and apply appropriate preventive measures because treatment may be difficult, and prognosis may be worsened by antibiotic bacterial resistance.<sup>10</sup> Other bacterial skin infections reported in this study include cellulitis, an infection that may be complicated by diabetes mellitus.<sup>14</sup> Although most of these infections are responsive to antibiotics, care should be taken so as not to overprescribe antibiotics for pilgrims and consequently encourage the development of bacterial resistance and other side effects of antibiotics.<sup>15</sup>

Fungal infections were in the form of

tinea infections including tinea cruris, tinea pedis. and pityriasis versicolor. Tinea cruris characteristically affects pilgrims due to the warm, humid weather conditions, and wearing Ihram clothes, which are wrapped around their bodies. Tinea pedis may also be associated with excessive sweating and insufficient drying of skin following ablution. Prevention is the most important means to reduce incidence of these infections by following hygienic practices, wearing cotton clothes,<sup>16</sup> and avoid sharing clothes and towels.

Eczema accounted for only 12% of all skin disorders. Higher percentages of 23.8% and 24.8% were reported among pilgrims during their stay in Makkah where the weather is humid and warmer.<sup>8,7</sup> March blisters are also reported. These could hinder the pilgrims' movement and affect their ability to meet their rituals.

Sun burns were reported in this study. These are preventable, and pilgrims can be advised to avoid sun from 10 am to 4 pm, wear protective clothes, avoid walking shoeless, and use sunscreens and umbrellas.

Allergies (urticarial) were the fifth most common documented skin disorder. Previous studies reported that it is the fourth most common skin disorder.<sup>7</sup> It is important to highlight the importance of taking a thorough medical history from patients regarding the history of allergies and to exclude a positive history of food or drug allergy before prescribing any medications particu-

**Table 3. Ethnicity in association with various dermatological findings.**

	Ethnicity, n (%)			P value
	African	Asian	Others	
Accidents				0.002*
No	105 (57.4)	180 (56.3)	39 (83.0)	
Yes	78 (42.6)	140 (43.8)	8 (17.0)	
Burns				0.192
No	168 (91.8)	289 (90.3)	39 (83.0)	
Yes	15 (8.2)	31 (9.7)	8 (17.0)	
Infections				0.027*
No	132 (72.1)	243 (75.9)	27 (57.4)	
Yes	51 (27.9)	77 (24.1)	20 (42.6)	
Allergy				0.613
No	173 (94.5)	304 (95.0)	43 (91.5)	
Yes	10 (5.5)	16 (5.0)	4 (8.5)	
Eczema				0.809
No	162 (88.5)	282 (88.1)	40 (85.1)	
Yes	21 (11.5)	38 (11.9)	7 (14.9)	
AID			0.418	
No	178 (97.3)	309 (96.6)	47 (100.0)	
Yes	5 (2.7)	11 (3.4)	0 (0.0)	
CTD				0.563
No	180 (98.4)	313 (97.8)	47 (100.0)	
Yes	3 (1.6)	7 (2.2)	0 (0.0)	

AID: Autoimmune disease exacerbations; CTD: connective tissue disease exacerbations. \*Statistically significant difference.

larly antibiotics and nonsteroidal anti-inflammatory drugs.<sup>17</sup>

Fortunately, the rate of acute exacerbations of autoimmune diseases like pemphigus vulgaris in this study was very low. Hajj long journey may be stressful to some pilgrims. This stress is likely to play a role in triggering flare in autoimmune diseases.<sup>18</sup> Although autoimmune vesiculobullous diseases are rare, they may have severe clinical manifestations, and treatment in the form of immunosuppressants should be prompt and aggressive to prevent complications.<sup>19</sup> Further, many of these patients are considered immunocompromised because of prolonged intake of immunosuppressants like corticosteroids which can have adverse effects by complicating the clinical outcomes.<sup>20</sup>

The study has limitations being retrospective in nature with the possible occurrence of unknown potential confounders.

## Conclusions

It seems that pilgrims from Asia and Africa, who are the majority of pilgrims, are mainly prone to dermatological accidents, followed by infections, eczema and burns. Most of these diseases are preventable by employing safety measures, implementing hygienic standards and applying protective measures against adverse weather conditions. Public health measures, and international collaboration in monitoring pilgrims' numbers and initiating awareness programs prior to Hajj season are a priority. Utilization of social media in the respective countries can also be considered.

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