




Acute Complications of Diabetes Among Pilgrims During Hajj 2017: A Brief Report

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ABSTRACT

Introduction: Diabetes mellitus (DM) was reported as one of the most common non-communicable diseases during Hajj. However, few studies evaluated acute complications of DM during Hajj. Therefore, this study aims to explore the most common acute complications among pilgrims with DM during Hajj 2017 and its clinical presentations.

Methods: This is a descriptive cross-sectional study. Data were collected using an anonymous questionnaire from the database of pilgrims with DM, who sought medical care in mobile clinics in Mina during the peak period of Hajj from 31 August to 4 September 2017. Data were

entered afterwards into an Excel sheet and analyzed using SPSS.

Results: In this study, a total of 281 pilgrims were recruited, male to female ratio 3:1. Out of 281 pilgrims, 199 (70.8%) had foot injuries, 77 (27.4%) had hyperglycemia, and 37 (13.2%) had hypoglycemia, noting that some of them presented with more than one complication. Most of the participants who developed foot injuries, presented with redness (28.8%) and bullous (20.6%). The most reported symptoms among hyperglycemic pilgrims were polydipsia (17.1%) and dry mouth (16.4%). Also, the most reported symptoms of hypoglycemia were fatigue (14.9%) and headache (12.5%). In addition, pilgrims with type 2 DM reported a higher rate of acute complications compared to type 1 DM (81.8% versus 18.2%, $p = 0.33$).

Conclusion: The most common acute complication of diabetes during Hajj is foot injury. Pilgrims who suffered from hyperglycemia presented mainly with polydipsia, while those who developed hypoglycemia presented mainly with fatigue. There was no statistically significant difference according to the association between the type of diabetes and the occurrence of acute complications.

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Key Summary Points

Few studies have described that diabetes mellitus (DM) is a common non-communicable disease reported during Hajj; however, most of these studies did not inspect the acute complications of DM and its manifestations among pilgrims.

This study found that foot injury is the most reported acute complication among participants during Hajj, followed by hyperglycemia, then hypoglycemia.

This finding indicates the importance of foot care among pilgrims with diabetes especially that they may walk for long distances as part of Hajj rituals.

Also, this study described the most common manifestations that are usually associated with hyperglycemia and hypoglycemia among Hajj pilgrims.

INTRODUCTION

Hajj is a large annual mass gathering event in Islamic culture that localizes in Mecca, Saudi Arabia. Hajj rituals require physical activities including walking for long distances every day [1]. According to the statistics of Hajj 2017, there were 2,352,122 pilgrims, including 600,108 domestic pilgrims (25.5%), and 1,752,014 foreign pilgrims (74.5%) [2]. There are specific days in Hajj that require walking for longer distances, which increases susceptibility to foot injuries [3]. Some of the pilgrims, especially elders, have chronic diseases, such as hypertension, cardiovascular diseases, and diabetes mellitus (DM) [4]. DM is one of the riskiest non-communicable diseases during Hajj [5] since it is associated with morbidities like chronic heart diseases, stroke, amputation, and renal failure [6]. Moreover, environmental and climate change, altered food habits, and

overcrowding are factors that may have a negative impact on pilgrims with DM in terms of controlling their DM. Therefore, it is recommended to control DM and visit a doctor before Hajj [4, 7].

One of the complications of DM that is encountered is hyperglycemic emergency such as diabetic ketoacidosis and hyperosmolar state that are precipitated by repeated illness and poor compliance with insulin/medications. In a 2011 prospective study on patients with diabetic ketoacidosis, poor compliance with treatment was the main precipitating factor (94%) [1]. Another study reported that hypoglycemia is a dangerous complication of DM during Hajj as a result of the differences in insulin doses and the routes of administration [7]. Therefore, this study aims to explore the most common acute complication among pilgrims with DM during Hajj in 2017.

METHODS

This is a descriptive cross-sectional study. All pilgrims with DM who attended the mobile clinics in Mina and Arafat during Hajj from August 29, 2017 to November 4, 2017 were invited to participate in this study, while other patients who were not pilgrims nor having DM were excluded. These mobile clinics were run by physicians and trained healthcare workers.

A data collection form was completed with information about each pilgrim's health. The first part concentrated on non-identifiable demographic information, including nationality, age, sex, weight, height, and chronic illnesses. The second, third, fourth, and fifth sections were only for pilgrims with known DM. They included information on the type of DM, the medication used, and preventive measures taken before and during Hajj, such as physician advice, wearing protective shoes, eating daily meals, influenza vaccination, wearing a wrist band indicating diabetes, compliance with treatment during Hajj, and self-monitoring blood glucose. The fourth part concentrated on foot injury. The last part asked about hyperglycemic and hypoglycemic signs and symptoms.

Data were collected from files onto an Excel sheet. Statistical Package for the Social Sciences (SPSS) software, version 21, was used for all statistical analyses. A *p* value less than 0.05 was considered statistically significant.

Ethics

Ethical approval for this study was obtained from the Institutional Review Board (IRB) at King Abdullah Medical City, Makkah, Saudi Arabia (IRB No. 18-434, 12/July/2018). This study used an anonymous questionnaire and did not collect any specimens or personal data from the participants. Therefore, the IRB approved the verbal consent to be obtained from each participant before their participation in the study.

RESULTS

The study consisted of 281 pilgrims, with a male to female ratio of 3:1. Participants mostly originated from Egypt (25.3%), followed by Pakistan (19.2%). Acute complications of DM among the participants were as follows: foot injuries 199 (70.8%), hyperglycemia 77 (27.4%), and hypoglycemia 37 (13.2%); some of them had more than one complication (Table 1). Among foot injuries, 81 (28.8%) pilgrims presented with redness, while 58 (20.6%) had bullous. Among hyperglycemic patients, 48 (17.1%) presented with polydipsia, and 46 (16.4%) had dry mouth, 45 (16%) presented with polyuria, and 37 (13.2%) presented with polyphagia. Among hypoglycemic patients, 42 (14.9%) presented

Table 1 Percentage of acute complications of DM during Hajj 2017

	Sex	
	Male (<i>n</i> = 238)	Female (<i>n</i> = 75)
Foot injuries	153 (72.9%)	46 (66.6%)
Hyperglycemia	58 (27.6%)	19 (27.5%)
Hypoglycemia	27 (12.9%)	10 (14.5%)

n Total number of responses

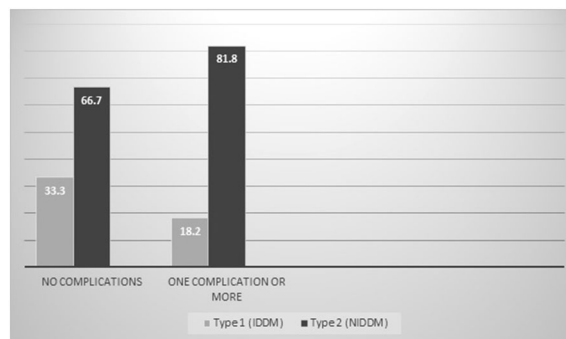


Fig. 1 Type of diabetes and occurrence of acute complications

with fatigue, and 35 (12.5%) reported headaches, 33 (11.7%) presented with sweating, 24 (8.5%) presented with anxiety, and 20 (7.1%) presented with increased heart beats. Pilgrims with type 2 (non-insulin-dependent diabetes mellitus, NIDDM) DM reported a higher rate of acute complications (81.8%) comparing to those with type 1 (IDDM) (18.2%), but the finding was not statistically significant (*p* = 0.33) (Fig. 1).

DISCUSSION

We found, in our study, that the most common acute complications among pilgrims with DM were foot injury, followed by hyperglycemia, then hypoglycemia.

The most common presenting symptoms of acute foot injury we recorded was redness (28.8%), followed by bullous (20.6%). In another study, conducted in 2014, bullous (34%) was the most common presenting foot injury symptom, followed by redness (25%), because only 7% [4] of the participants wore protective footwear before and during rituals [8]. In our study, 37 (18.6%) wore medical shoes.

Also, we found that most injuries occurred in Al Mashaaer, and 28.9% of them occurred on Arafat day (day 9). Most of the injured were not wearing socks and just wearing flip-flop shoes, while the other study reported that 45% of cases presented on day 10 [3].

Those complications actually happened as a result of many struggles that the pilgrims have

to do, such as walking for long distances. During all Hajj activities, pilgrims walk an estimated 58 km. Further, the effects of hot weather on most barefoot pilgrims exacerbated diabetic neuropathy [9].

Polydipsia (17.1%) was the most common presenting symptom of hyperglycemia. Another study conducted on pilgrims with diabetic ketoacidosis found that polyuria and polydipsia (94%) were the most common presenting symptoms [10]. Multiple factors during Hajj can cause hyperglycemia, such as poor treatment and infection [1]. Furthermore, respiratory tract infections are the most common infection transmitted between pilgrims during Hajj [11].

For hypoglycemic patients, fatigue (14.9%) was the most common presenting symptom. In general, hypoglycemia in pilgrims with DM may be due to increased physical activities and delayed mealtimes, especially at a time of prayer [1, 7]. Another study reported differences between insulin concentrations available in some countries (Egyptian, Syria, India) as opposed to the one in Saudi Arabia, which played a major role in producing hypoglycemia [7].

We noticed that most of the participants who developed acute complications during Hajj had insufficient diabetic control; 65.5% did not see their camp physician, 52.6% did not take a medical consultation about managing their DM before coming to Hajj, 65.5% did not bring an insulin bag, 70.4% did not bring a glucometer, and 74.7% did not check their blood sugar regularly. In another study, 72% did not bring a glucometer, 55% received DM consultation, and only 37% checked their blood sugar [12]. One study showed that the complications experienced by pilgrims with type 1 DM were not related to travel, but were related to glycemic control [5]. In the end, we did not find a significant difference in the type of DM and association with the occurrence of acute complications.

This is to our knowledge the first study to evaluate the acute complications of DM among pilgrims and it was conducted during Hajj. However, our study sample size was small and could not support the generalization of our results to all other pilgrims with DM, but it gives

us a hint about the importance of such complications and their consequences on pilgrims' health and performance during the Hajj event. Also, the questionnaire was designed for medical services, not research purposes, so certain information, like age and random blood sugar measurements, were missing, and the data was collected by using a hardcopy paper questionnaire in a very crowded area which may lead to loss of some data or the questionnaire itself. In addition, in our sample, the male to female ratio was 3:1, which does not represent the population, which was 1.3:1.

CONCLUSION

We recommend increased awareness and education of pilgrims with DM and their families about complications of DM and insulin dosage during stress. Pilgrims who are known to have DM should be provided with special cards to identify them during emergency situations.

We recommend further research with a larger sample size in different settings to explore the prevalence of acute complications of DM during Hajj.

Our future plan is to conduct research to assess pre-Hajj management of DM and its effect on the occurrence of acute complications by using HbA1c.

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