Introduction

The Hajj is the Fifth pillar of Islam, an annual Islamic pilgrimage to Makkah, Saudi Arabia and a mandatory religious duty for Muslims which must be carried out at least once in their lifetime by all Muslims who are physically and financially capable of undertaking the journey, and can support their family during their absence [1].

Every year, millions of Muslims make a religious pilgrimage to Makkah on the eighth through thirteenth days of month 12th (Dhu-alihjah) of the Islamic calendar [2]. The gathering during Hajj is considered one of the largest annual gatherings of people in the whole world over a short period of time. Because the Islamic calendar is roughly eleven days shorter than the Gregorian calendar, the Gregorian dates for Hajj varies from one year to another. Thus, each year in the Gregorian calendar, the pilgrimage starts eleven days (sometimes ten days) earlier than the preceding year which affects the season that the Hajj will be held in every few years [3].

During Hajj, pilgrimages perform a series of physical practice which considered moderate in intensity. Those includes person walks counter-clockwise seven times around the Ka‘ba, also walks back and forth between the hills of Al-Safa and Al-Marwah, goes to the plains of Mount Arafat and Muzdalifa, and performs a lot of walking between sites. The practices are themselves simple, but the amount of physical activity, the hot climate, and the crowds make the Hajj a rigorous exercise in faith.

Diabetes mellitus is a metabolic disorder characterized by chronic hyperglycemia with disturbances of protein, carbohydrate and fat metabolism resulting from defects in the action, secretion of insulin or both. The effects of diabetes mellitus include long-term damage and serious long-term complications include cardiovascular disease, stroke, kidney failure, foot ulcers and damage to the eyes which may impact their abilities to perform physical activity [3]. Symptoms include increased in thirst, hunger and frequent urination with the increase in the physical activity may predispose patients to numbers of acute complications like hypoglycemia and dehydration [4].

As of 2014, an estimated 387 million people have diabetes worldwide [5]. 80% of diagnosed cases were in low& middle-income countries, which is equal to 8.3% of the adult population [6]. In the years 2012-14, diabetes is estimated to have resulted in 1.5-4.9 million deaths per year which at least double the risk of death [6]. The number of people with diabetes is expected to rise to 592 million by 2035 [5]. The global economic cost of diabetes in 2014 was estimated to be $612 billion USD [7]. According to the most recent IDF publication, at least 3 out of the top 10 countries with the highest prevalence rates of diabetes in the world are within the Arabic Gulf region (Saudi Arabia 24%, Qatar 23%, and Kuwait 23%) [7].

With increase physical activity during Hajj which may precipitate patients for the acute complications. Many diabetic pilgrimages are admitted to hospitals from diabetic complications during Hajj trip with heart, kidney diseases or diabetic foot [8,9].

The diabetes education is an important aspect to understand...
the disease, how it affected by the lifestyle, how to properly manage the diabetes emergency condition like hypoglycemia, and to how to minimize the risk of such complications [10].

The primary study aim was to assess the patient readiness to Hajj trip and its association with type of care, advice received and history of multiple hajj performance.

Methodology

Population and design

A cross-sectional study was conducted between Oct 4th- 6th, 2014. We conveniently selected pilgrimages with diabetes aged 18 years and older from different pilgrimage campaigns in the holy city of Makkah were offered to participate in the study and the information were filled and collected by the team members. The body weight (BMI), height, fasting glucose level, random glucose level, and recent HbA1c were subjectively self-reported.

Data collection

The survey included socioeconomic data, number of previous Hajj trip, pre and during Hajj diabetes related education, and self-reported chronic conditions. The chronic conditions we inquired about were hypertension, hyperlipidemia, stroke, peripheral vascular disease, snoring/witness apnea, chronic renal disease, and diabetic foot ulcer. To assess diagnosed diabetes respondents were asked 4 separate questions: “Have you ever been told by a physician, nurse or other health professional that you have diabetes mellitus? 2) type of diabetes; 3) duration of Diabetes; 4) management of diabetes (oral, insulin, or both).

Pilgrimages readiness and preparation for the Hajj was assessed by the following parameters; the last visit to the diabetes clinic within the last 3 months prior to the Hajj; informing patient physician about the hajj plan, the specialty of the caring physician; any change or adjustment made to the patient medications by the provider; did patient physician performed ECG as part of pre-Hajj clinic evaluation before the trip; regular glucose checking during the Hajj trip; carrying enough supply of medications during the Hajj, wearing wristband, carrying cool wallets for insulin, letter from the caring physician detailing the medical problem and the medications, hand luggage rescue carbohydrate, protective shoes, and diabetes emergency kit.

Data analysis

We analyzed the demographic characteristics and the preparation for the Hajj categories between whom done the hajj for the 1st time and those who performed it before by using the SPSS program using one-sample T-test. The primary goal of this study is to survey and evaluate the diabetic’s clinical characteristics and its relation to patient readiness to Hajj trip based on their previous Hajj performance. We also assessed the relation between the different health care provider specialty and the Hajj readiness parameters.

Results

Total of 262 pilgrimages with diabetes participated 237 (90.5%) were male and 25 (9.5%) were female, 65.3% were Saudi and 34.7% Non-Saudi, 95.4% were Middle Eastern ethnicity, 3.4% were African, and 1.15 were Asian. 55.7% with a degree of high school or higher and 21% with an intermediate school degree or less (Table 1). (Please refer to 2nd paragraph in the discussion)

The mean age was 53.06 years old (SD 11.7 years), mean BMI 29.65, 72.9% have type 2 diabetes (T2D) and 27.1% were type 1 diabetes (T1D), with a mean duration of diabetes is 9.23 years, and among them 40% were also hypertensive, 46% with hyperlipidemia and 5.7% with chronic kidney disease. The mean number of previous Hajj trips was 4.16 times.

Of the interviewed pilgrimages with diabetes, 180 (68%) were following up with General Practitioner, 65 (25%) with an

| Table 1: Baseline Characteristics. |
|-----------------------------------|
| **Gender** | N   | (%)     |
| **Male**   | 237 | 90.50%  |
| **Female** | 25  | 9.50%   |
| **Age**    |     |         |
| 18 – 34 y  | 17  | -6.48%  |
| 35 – 54 y  | 120 | -45.80% |
| 55 – 74 y  | 114 | -43.50% |
| >75        | 11  | -4.20%  |
| **Mean age** | 53.1 yrs | SD 11.7 yrs |
| **Nationality** |     |         |
| Saudi      | 171 | -65.27% |
| Non Saudi  | 91  | -34.73% |
| **Ethnic**    |     |         |
| Eastern Mediterranean and Middle East | 250 | 95.40% |
| South Asians| 3   | 1.10%   |
| African    | 9   | 3.40%   |
| **Hajj Performance**    |     |         |
| 1st time of Hajj Trip | 79  | 30.20%  |
| Previous Hajj Performance | 183 | 69.80%  |
| **Mean times of previous hajj** | 4.2 times | SD 7.2 |
| **Number of previous hajj attempt** |     |         |
| 0 – 3 Times | 179 | -68.32% |
| 4 – 9      | 48  | -18.32% |
| >10        | 35  | -13.36% |
| **Education** |     |         |
| Illiteracy | 32  | -12.21% |
| Primary-Intermediate School | 55  | -20.99% |
| High school-Bachelor degree | 146 | -55.73% |
| Master-PhD | 29  | -11.07% |
| **Diabetes Mellitus** |     |         |
| Type 1     | 71  | -27.10% |
| Type 2     | 191 | -72.90% |
| Fasting Blood Glucose | 151.4 Sd 54.1 |
| Random Blood Sugar | 224 Sd 78.3 |
| Hb A1c     | 8.2 | Sd 2.6 |
| **Duration of Diabetes Mellitus** | 9.2 yrs | SD 7.5 yrs |
| **Hypertension** |     |         |
| Yes        | 105 | -40.10% |
| No         | 157 | -59.90% |
| **Mean BMI** | 29.7 | 5.9     |
| **Specialist Physicians** |     |         |
| General Practitioner (GP) | 180 | 68.70%  |
Compared between participated pilgrimages with diabetes who did Hajj for the 1st time to who did it more, 79 (30%) vs 183 (70%).

Mean age is 51.7 yr vs. 53.7 (p .21), mean BMI 30.8 vs. 29.2 (p.07), mean duration of diabetes 9.5 yrs vs. 9.1 yrs (p.68), mean time of the last clinic visit was 65.4 days vs. 77 days (p.16), 35.4% informed their physician about their trip vs. 36.1% (p 0.92), 10.1% vs. 6.6% (p 0.32) have a medical letter describes their case from their providers, 32.9% vs. 24.04% ( p 0.12) changed their medications prior to the trip, and 46.8% vs. 46.4% ( p0.9) did ECG prior to their Hajj (Table 2).

1st time Hajj performers vs. previous performers, 67.1% vs. 67.2% ( p 0.63) carries enough medications supply, 20% vs. 20.8% ( p 0.23) carries extra-supply, 16.5% vs. 20.8% ( p 0.42) reports checking their glucose during the Hajj, 5.1% vs. 6.0% ( p 0.77) wear medical wristband, 20.3% vs. 18.3% ( p 0.67) carries hypoglycemia emergency rescue kit, 39.2% vs. 38.8% ( p 0.95) carries carb for rescue hypoglycemia, and 50.6% vs. 53.6% ( p 0.67) wear protective shoes. Of the total of 89 patients were on insulin, 61.5% vs. 47.6% ( p 0.45) carries insulin wallet (Figure 1).

Most of the caring providers were General Practitioner (GP) (Table 3). Comparing the patients characteristics according the specialties of the provider which are GP, Family physicians, and Endocrinologist; last visit to the clinic within last 90 days 58% vs. 82% vs. 92% ( p <0.05), last visit was 84 vs. 66 vs. 50 days ( p 0.12), 23% vs. 71% vs. 63% of the patients informed their physicians about the hajj trip (p<0.05). Checking glucose regularly before the trip was 39% vs. 77% vs. 60 % ( p 0.002), having medical letter describes their case from their providers 6% vs. 6% vs. 29% ( p 0.04), check glucose regularly during the trip was 16% vs. 24% vs. 28% ( p 0.04) (Figure 2).

36% of the sample informed their physicians about the Hajj Trip (Table 4). Compare to those who didn’t informed their provider
about their Hajj plan, 96% of those who informed their physician had their last clinic visit within the last 90 days (p <0.05), more likely to wear identifying wristband during the Hajj trip 12% (p 0.002) , more likely to carries carbohydrate hand luggage 53% (p <0.05) (Figure 3).

Discussion

Hajj is one of the five pillars of Islam which involves increase in the physical activities which may precipitate individuals with chronic medical conditions for acute complications. Pilgrimages with diabetes are at increased risk of such acute complications like dehydration and hypoglycemia. Proper patient’s education and making sure patients is ready for the trip is an essential component for a safe Hajj trip.

Up to our literature review and to the best of knowledge, there is no published study that has assessed the patients with diabetes readiness for such trip. In this study we showed that the overall readiness’s for pilgrimages with diabetes were poor according to the studied parameters. Those outcomes weren’t affected by demographic distribution, race, gender education level or the number of previous Hajj performance.

When we stratified patients according to the provider specialty, although there was no significant difference in their baseline
characteristics; the diabetics whom seen by the Family physicians or the Endocrinologist were significantly more likely to visit the clinic within 3 months from the Hajj trip, informing their provider about the Hajj plan, and more likely to check their glucose regularly. Only those seen by Endocrinologist were offered a medical letter explaining their medical condition and their medications.

Around half of the patients who were on insulin carries insulin wallet which is disappointing since the weather during the Hajj as well as the Hajj living situation (most of them stay in tents during the Hajj days) increases the chance of insulin denaturing which may increase the risk of dehydration and hyperglycemia.

Those who visited the provider clinic within the last 3 months from the Hajj season were more likely to inform their physicians about the Hajj trip and significantly more likely to wear medical wristband and more likely to carry carbohydrate for hypoglycemia treatment.
The observed poor readiness parameters despite the multiple previous Hajj performance may be related to lack of proper patient-physician communication as well as seeing general practitioner who may not aware about the recent related recommendations. Increase awareness among the providers and among the public about the importance of the clinic visit and informing the provider about the Hajj plan will increase the chance of proper readiness for such trip.

Our study has strength and limitations. The strength includes the relatively original research question that bridges relatively lack of information. The limitations that are our study design which limits our ability to assess causality, self-reported data, predominantly Saudi male, most of whom multiple Hajj performers, and the small sample size which limits the generalizability potential of such study.

Our recommendation to pilgrimages with diabetes who want to perform Hajj trip includes; patients should inform the caring physician about the Hajj Trip, optimize medical treatment with your provider aiming for better control of blood glucose and blood pressure during Hajj, vaccination (Influenza and meningococcal vaccines), carry adequate medications and cool pack to store insulin, finally carry hypoglycemic rescue kit [11]. Also, during Hajj Trip always wear Protective shoes, check glucose before any vigorous activity, drink a lot of water during the day (at least 8 glasses) [12] and Eating a balanced health food contain an adequate Carbs, Fat and Protein [13].

Conclusion

Pilgrimages with diabetes in our study were older, overweight and have longstanding history of diabetes. Except for carrying enough medications, all other studied Hajj trip readiness parameters were far below 50% which indicates poor preparation for the Hajj trip. There was no impact of previous Hajj performance on the study primary outcome.

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