Brief Communication

Diabetic profile of Pakistani pilgrims in Makkah during Hajj season (2007-2008)

Muhammad A. Sharif, MBBS, FCPS (Histopath),
Asad Mahmood, MCPS, FCPS (Medicine),
Javed-ur Rehman, MBBS, FCPS,
Kaswar S. Ansari, MBBS, FCPS (Medicine),
Sajid Munir, MBBS, FCPS (Surg).

Hajj is one of the 5 cardinal components of Islam and represents the culmination of years of spiritual preparation and planning. Hajj lasts for 5 days as the population of Makkah swells from 200,000 to more than 4 million. The devotees gather well before in time after traveling from different countries to a different environment having altered routine and diet.[1] Heat stroke, exhaustion, infectious diseases, respiratory illnesses, physical injuries, female menstrual problems, problems related to contact lenses, chronic diseases such as diabetes, hypertension, and cardiovascular diseases are a few medical conditions encountered in pilgrims during Hajj.[2] Extensive travelling, altered daily routine, living in crowded places, walking bare foot, in some part of the rituals and high risk of infections are a few of the factors, which have detrimental effects on chronic medical conditions including diabetes which require a relatively stable routine and environment for adequate glycemic control. Keeping in view the special circumstances of Hajj, a study was planned to determine the glycemic control of already known diabetic Pakistani pilgrims during the Hajj season. The findings of this study can be used to materialize policy guidelines specific for diabetic patients intending for Hajj and for the physicians to consider management plans with an aim to achieve good control and avoid complications.

The study was carried out at Makkah Al-Mukurramah, Kingdom of Saudi Arabia from 9th November 2007 to 2nd January 2008 at Pakistan Hajj Medical Mission Hospital, which is temporarily established every year for 3 months to provide emergency as well as routine medical treatment to Pakistani pilgrims during the Hajj season. Known diabetic patients taking treatment were included in the study by non-probability consecutive sampling. The patients were classified into insulin dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM) depending on their use of insulin or oral hypoglycemics for diabetic control. Non-diabetic patients or with an impaired glucose tolerance detected for the first time during investigation were excluded from the study. A brief clinical history was taken for number of years since diabetes, type of medicines, and difficulties faced by them in procurement and preservation of their medicines during the Hajj period. The sampling for plasma glucose levels was carried out during fasting, 2 hours after breakfast or randomly according to patient presentation in the out-patient department by taking 2.5 mL venous blood and estimated by chemistry auto-analyser using 1:4 dilutions for values >25 mmol/L.

The data were entered and analyzed using SPSS version 16.0. Frequency and percentages were computed for presentation of descriptive statistics of age, gender, type of diabetes, and sample type for plasma glucose estimation. Mean values of the plasma glucose and age of patients were determined and compared in IDDM and NIDDM patients using student's t-test for any statistical significance taking a p-value of <0.05 as significant.

During the study period, 2,176 diabetic pilgrims reported to the out-patient department of the hospital. The mean age of diabetic patients was 52 ± 10 years (range 10-95 years) with a male to female ratio of 2:1. Fasting plasma glucose levels were estimated in 399 (18.3%) patients, 2-hours after breakfast in 25 (1.1%) and random sample was taken in 1753 (80.5%) patients. The average duration of diabetic patients taking treatment was 5.4 ± 5 years with minimum of one month to maximum 35 years. There were 164 (7.5%) patients who were on insulin while 2,012 (92.5%) patients were on oral hypoglycemic medicines. Among 164 IDDM pilgrim patients, the mean age was 53 ± 10 years with a range of 20-80 years. The mean duration since diabetes was 8.7 ± 5 years. The mean plasma glucose level in these patients was 13.4 ± 6.6 mmol/L (242 ± 119 mg/dL) with minimum value of 3.4 mmol/L (61 mg/dL) and ranging to a maximum of 38.8 mmol/L (700 mg/dL). The NIDDM pilgrim patients had an age range of 35-95 years with a mean age of 51 ± 10 years. The mean plasma glucose level was 10.6 ± 5.27 mmol/L (192 ± 9 5 mg/dL). A low plasma glucose level of 0.8 mmol/L (16 mg/dL) was seen in an unconscious patient while the highest level was 44.8 mmol/L (808 mg/dL), which was estimated by dilution technique as it was beyond the linearity range for the testing method.

Table 1 shows the frequency distribution of plasma glucose level in type-I and type-II diabetic pilgrim patients according to their glycemic control. Dangerously low glucose levels below 3.5 mmol/L were seen in 15 (0.7%) patients and 14 were NIDDM patients. All the patients of NIDDM presenting with hypoglycemia were taking oral glibenclamide (Sulfonylureas) for their control of diabetes. A raised plasma glucose concentration above 16.6 mmol/L was seen in 311 (14.6%) patients. Comparison of the mean

Table 1 - Frequency distribution of diabetic profile in insulin dependent diabetes mellitus and non-insulin dependent diabetes mellitus during Hajj (n=2,176).

Plasma glucose level (mmol/L)	Fasting (n=399)		2 HABF (n=25)		Random (n=1752)	
	Insulin dependent diabetes	Non-insulin dependent diabetes	Insulin dependent diabetes	Non-insulin dependent diabetes	Insulin dependent diabetes	Non-insulin dependent diabetes
0 - 3.5	-	1 (0.3)	-	-	1 (0.7)	13 (0.8)
>3.5 - 5.5	2 (7.7)	55 (14.7)	1 (0.25)	3 (14.3)	5 (3.7)	188 (11.7)
5.6 - 7.0	5 (19.2)	83 (22.2)	1 (0.25)	4 (19.0)	6 (4.5)	237 (14.6)
>7 - 11.0	10 (38.5)	140 (37.5)	0 0	6 (28.6)	42 (31.3)	515 (31.8)
>11.0 - 16.6	6 (23)	66 (17.7)	1 (0.25)	8 (38.1)	40 (29.9)	426 (26.3)
>16.6 - 22.2	1 (3.8)	24 (6.4)	1 (0.25)	-	25 (18.7)	166 (10.2)
>22.2 - 27.7	2 (7.7)	3 (0.8)	-	-	9 (6.7)	58 (3.6)
>27.7 - 33.3	-	1 (0.3)	-	-	5 (3.7)	12 (0.7)
>33.3 - 38.8	-	-	-	-	1 (0.7)	2 (0.1)
>38.8	-	-	-	-	0 0	1 (0.1)
Total	26	373	4	21	134	1618

HABF - hepatic artery blood flow

age of IDDM patients (53±10 years) and NIDDM patients (51±10 years) using paired sample t-test showed no significant difference as $p>0.156$ was insignificant. However, the glycemic control in IDDM (13.4±6.6 mmol/L) and NIDDM patients (10.6±5.27mmol/L) showed a significant difference as $p<0.0001$ was highly significant using student t-test.

The summary of the difficulties faced by the diabetic patients during Hajj showed that they had difficulty in procurement of the oral hypoglycemic medicines as they brought these medicines in limited quantity and were not freely allowed to carry those medicines on their flights to Saudi Arabia. However, IDDM patients had difficulty in maintaining the cold chain and preservation of insulin. Pakistan, a South-Asian country, has a population of approximately 150 million with a high prevalence of diabetes as 12% in people >25 years of age and another 10% having impaired glucose tolerance.[3] Diabetes has been attributed to 2% of deaths among pilgrims with frequency of diabetes in hospitalized patients of 15-31.9% during the Hajj season.[4] Diabetes was found in 19% pilgrims during 2005 and rates as high as 43% have been reported in nationals from Arabian countries while it was 5% from African countries.[5] Hypoglycemic episodes have been assumed to be common during Hajj by personal experiences in emergency hospital services, but no concrete data are available on the subject. Study by Baomer et al[6] on 169 Omani pilgrims showed plasma glucose <4.0 mmol/L in 2.4% of patients. The present study shows dangerously low hypoglycemia of 0.8 mmol/L in one patient and values of 1.4 mmol/L in 2 patients. Plasma glucose levels <3.5 mmol/L was seen in 1 (0.6%) patient of IDDM and 14 (0.7%) patients of NIDDM. The patients of NIDDM with hypoglycemia were taking oral glibenclamides for their control of glucose levels, which have a known side effect of hypoglycemia. All the pilgrim patients had brought their own medicines and insulin from Pakistan, but had difficulty in keeping the cold chain for insulin preservation during travel which can also be one of the factors of better glycemic control in type II diabetics as compared to type I diabetic pilgrims. Excessive physical exercise, smaller meals, loss of routine balanced diet, altered meal routines, and skipped meals due to preference for performing prayers in the Holy shrines are some of the factors responsible for poor glucose control and hypoglycemic episodes during Hajj. Moreover, excessive heat during summer seasons may also enhance insulin absorption causing hypoglycemia. The difference in insulin concentration by units per mL in Saudi Arabia and other countries have also been attributed to hypoglycemic episodes as Saudi Arabia has insulin concentration of 100 units/mL while in India and Egypt it is 40 units/mL. Poor compliance with treatment has been one of the precipitating factor for hyperglycemia and episodes of diabetic keto-acidosis. Study by Yusuf et al[7] showed a mean plasma glucose of 33.3 mmol/L in patients admitted in the hospital for diabetic ketoacidosis during Hajj with a reported mortality of 5.6%. Baomer et al[6] study in Omani pilgrims showed 49% diabetic pilgrims had plasma glucose levels of >10.5 mmol/L.

The results of the present study also show fasting plasma glucose levels of >7 mmol/L in 19 (73%) IDDM and 233 (62.7%) NIDDM pilgrims. Similarly, random plasma glucose value of 11.1 mmol/L was seen in 80 (59.7%) IDDM and 665 (41.1%) NIDDM pilgrims. Values >33.3 mmol/L were present in 4 (0.2%) patients and no mortality were reported in these patients. Lack of adequate storage facilities for insulin and difficulty in availability of balanced diet during Hajj with excessive travelling were attributed for the poor control. Due to poor storage facilities for insulin, there was a significance difference in the glycemic control in type I (13.4 ± 6.6 mmol/L) and type-II diabetic patients (10.6 ± 5.27 mmol/L) as $p<0.0001$. Moreover, no record of pre-Hajj diabetic control of these patients was available with these patients. Diabetic control in Pakistani diabetics is otherwise poor with 51% having mean HbA_{1c} of 10.1% ±1.7.[8] The present study shows that although the hypoglycemic episodes are an acute emergency and life threatening which can be overcome by simple remedial measures, but were not seen in many Pakistani pilgrims. On the contrary, diabetic control in majority of the Pakistani pilgrims was worse in IDDM than NIDDM, making them vulnerable to diabetic ketoacidosis and other acute and long term complications.

Patient education to adjust insulin dose according to meal intake and anticipated exertion is advised. Special emphasis on documentation of pre-travel glucose profile and treatment record is recommended so that dose modifications may be carried out by the treating physicians during Hajj and in case of any concurrent illness keeping in view cultural circumstances and individual needs. Storage facilities for insulin in living accommodations and glucose monitoring facilities during Hajj may also be provided to cater for diabetic patients since the frequency of diabetic pilgrims is high.

References

1. Beshyah SA, Sherif IH. Care of people with diabetes during the Moslem pilgrimage (Haj) an overview. *Libyan Journal of Medicine* 2008; 3: 39-41.
2. Madani TA, Ghabrah TM, Albarrak AM, Alhazmi MA, Alazraqi TA, Althaqafi AO, et al. Causes of admission to intensive care units in the Hajj period of the Islamic year 1424 (2004). *Ann Saudi Med* 2007; 27: 101-105.
3. Shera AS, Jawad F, Basit A. Diabetes related knowledge, attitude and practices of family physicians in Pakistan. *J Pak Med Assoc* 2002; 52: 465-470.
4. Khan NA, Ishaq AM, Ahmad MS, El-Sayed FM, Bachal ZA, Abbas TG, et al. Pattern of medical diseases and determinants of prognosis of hospitalization during 2005 Muslim pilgrimage Hajj in a tertiary care hospital. A prospective cohort study. *Saudi Med J* 2006; 27: 1373-1380.
5. Al-Salamah SM. General surgical problems encountered in the Hajj pilgrims. *Saudi Med J* 2005; 26: 1055-1057.
6. Baomer AA, El-Bushra HE. Profile of diabetic Omani pilgrims to Mecca. *East Afr Med J* 1998; 75: 211-214.
7. Yusuf M, Chaudhry S. Diabetic keto-acidosis in pilgrims visiting Madinah Al-Munawarah, Saudi Arabia. *Int Diabetes Digest* 1998; 8: 14-16.
8. Mahmood K, Aamir AH. Glycemic control status in patients with type-2 diabetes. *J Coll Physicians Surg Pak* 2005; 15: 323-325.

Related topics

Khan NA, Ishag AM, Ahmad MS, El-Sayed FM, Bachal ZA, Abbas TG. Pattern of medical diseases and determinants of prognosis of hospitalization during 2005 Muslim pilgrimage Hajj in a tertiary care hospital. A prospective cohort study. *Saudi Med J* 2006; 27: 1373-1380.

Khaled BM, Bendahmane M, Belbraouet S. Ramadan fasting induces modifications of certain serum components in obese women with type 2 diabetes. *Saudi Med J* 2006; 27: 23-26.

Khatib FA, Shafagoj YA. Metabolic alterations as a result of Ramadan fasting in non-insulin-dependent diabetes mellitus patients in relation to food intake. *Saudi Med J* 2004; 25: 1858-1863.