

ORIGINAL STUDY

Complications of Diabetes Mellitus Among Patients Attending Outpatient Clinics in Qatar

*Zirie M.A., **Yousef M.F. and **Al Mashaly A.

*Endocrine & Diabetes Division, Department of Medicine, Hamad Medical Corporation

**Program of Nutritional Sciences, Department of Health Sciences, College of Science, Qatar University
Doha, Qatar

Abstract:

The objective of this study was to explore the prevailing complications of diabetes mellitus and to explore some of the associated factors among Qatari patients previously diagnosed as having diabetes mellitus. A random sample of Qatari diabetic patients attending outpatient clinics (8 am to 12 pm) attached to Hamad General Hospital, between May 2001-2002 were included in the study. The total sample was 225, 74 males, and 151 females. The results revealed that retinopathy was the most prevailing complication (43.6%), followed by nephropathy (40.9%), hypertension (36.9%), neuropathy (28.9%), hyperlipidemia (26.7%), coronary heart disease (18.7%), foot ulcer (4.4%), and thyroid problems (3.6%). A significant association between development of hypertension and high body mass index (BMI) was found. Neuropathy and thyroid problems were significantly higher in females. (56.9%) of the patients were obese (BMI ≥ 30 kg/m²), and 28.9% were overweight (BMI 25-29.9). Two thirds of the patients had positive family history of the disease, and females who had diabetic fathers were significantly higher than males.

Introduction:

The term diabetes mellitus describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of fat, carbohydrate, and protein metabolism resulting from defects in insulin secretion, insulin action, or both. The effects of diabetes mellitus include long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels⁽¹⁾.

It is estimated that over 140 million people worldwide have diabetes⁽²⁾. This figure is expected to be 300 million by the year 2025⁽³⁾. The alarming increase of diabetes prevalence is pro-

jected to happen because of population aging, unhealthy diet, obesity, and a sedentary lifestyle⁽⁴⁾. The rapid socioeconomic development in the Arab countries had led to cultural changes that are observed in rapidly developing countries leading to increase in obesity, diabetes, and other related diseases^(5,6).

The number of diabetes cases in both types 1, and 2 is increasing in Qatar⁽⁷⁾. The objective of this study was to explore the prevailing complications of diabetes mellitus among Qatari diabetic patients, and to explore some of the associated risk factors such as (age, duration of diabetes, obesity, and family history of the disease).

Methodology:

Data collection:

This study was carried out during the Diabetes Registration Program, which was started in May 2002 to register all the diabetic patients. The target group of this study was Qatari diabetic patients attending Outpatient Clinics attached to Hamad General Hospital, which is the only governmental hospital in Doha. The patients were previously diagnosed as having diabetes mellitus. The patients were of all ages, who attended the outpatient clinics between 8 a.m and 12 p.m during the period May 2001 – May 2002. Data were collected by patient interview.

Health workers using diabetes registry forms interviewed the patients, and demographic data were recorded. The forms included data about date of diagnosis, diabetes complications such as, retinopathy, nephropathy, neuropathy, hyperlipidemia, foot ulcers and thyroid problems. The occurrence of some chronic diseases such as hypertension, coronary heart diseases (CHD), and medications in use such as insulin and oral hypoglycemics (Gliclazide, Metformin and Gilbenclamide) were collected from patient's health files for retrospective analysis.

Trained health workers measured weights and heights of the patients.

Weight was measured using pre-calibrated SECA scale to the nearest 0.1 kg in outdoor clothes. Height was measured without shoes to the nearest 0.5 cm.

To explore a possible effect of obesity on diabetes, the body

Address for correspondence:

Dr. Mahmoud A. Zirie, MD, FACE, FACP

Department of Medicine, Hamad Medical Corporation

P. O. Box 3050, Doha, Qatar; Fax: (+974) 4392273

E-mail: alihilal@hmc.org.qa

mass index (BMI), which is defined as (the weight in kilograms divided by the height in meter squared) was used. The WHO classification of BMI was adopted, were patients with (BMI 18.5-24.9) were considered normal weight, while those with (BMI 25-29.9) were overweight, and obese patients were having (BMI ≥ 30 Kg/m²).

Family history of diabetes was grouped into two categories: positive, were any of the parents (mother or father) or both, or any of the children had diabetes, and negative were none of parents or children had diabetes. Smoking behavior was classified into two categories, smokers and nonsmokers.

Data analysis:

Minitab software package, version 1.3 was used for data management and analysis. Chi-square analysis was used to compare differences between groups.

Results:

Females were 151 (67.1%) of the sample, patients age > 45 years were 174 (77.3%), 170 (76.4%) had diabetes for >10 years. 217 (96.4%) had type 2 diabetes, and 150 (66.7%) had positive family history of the disease. 130 (57.8%) of the patients had no diabetes education, and 215 (95.6%) were non-smokers.

Retinopathy was the most prevailing complication 98 (43.6%), followed by nephropathy 92 (40.9%), hypertension 83 (36.9%), neuropathy 65 (28.9%), hyperlipidemia 60 (26.7%), coronary heart disease 42 (18.7%), foot ulcer 10 (4.4%), and thyroid problems 8 (3.6%).

Males had higher prevalence of most of the complications, except neuropathy, and thyroid problems, which were significantly higher in female, and foot ulcer, which was not significantly higher. *Table 1* presents complications of diabetes by gender.

Table 1: Complications of diabetes by gender

Complication	Male (74)		Female (151)	
	No.	%	No.	%
Retinopathy	36	(48.6)	62	(41.1)
Nephropathy	33	(44.6)	59	(39.1)
Hypertension	31	(41.9)	52	(34.4)
Hyperlipidemia	20	(27)	40	(26.5)
CHD	18	(24.3)	24	(15.9)
Neuropathy*	15	(20.3)	50	(33.1)
CHD	18	(24.3)	24	(15.9)
Foot Ulcer	3	(4.1)	7	(4.6)
Thyroid*	0	(0)	8	(5.3)

* $P < 0.05$

The results revealed that 150 (66.7%) of the patients had positive family history of diabetes ($p < 0.001$), 112 (49.8%) females, and 38 (16.9%) males. *Table 2* presents family history of diabetes by gender.

Table (2): Family history of diabetes by gender

Family history of diabetes	Male 74		Female 151		P value
	No.	%	No.	%	
Negative	36	(48.6)	39	(25.8)	0.001*
Positive:	38	(51.4)	112	(74.2)	
▪ Mother	18	(24.3)	36	(23.8)	0.05*
▪ Father*	2	(2.7)	15	(9.9)	
▪ Both parents	8	(10.8)	27	(17.9)	
▪ Children**	10	(13.5)	34	(22.5)	

**One child or more had the disease in the family

193 (85.8%) of the patients had above the desirable body weight (BMI ≥ 25), 65(28.9%) over-weight, and 128 (56.9%) obese. 148 (76.7%) of these patients were > 45 years old, and 45 (23.3%) were ≤ 45 years. The association between age of diabetic patients and their BMI was not statistically significant.

144 (74.6%) of the patients who had (BMI ≥ 25), had diabetes for > 10 years, compared to 49 (25.4%) had diabetes for ≤ 10 years. There was no statistically significant association between duration of diabetes and BMI.

There was statistically significant association between high BMI and development of hypertension in the diabetic patients ($p < 0.000$).

145 (64.4%) of the patients were treated by insulin, and 201(89.3%) were taking oral hypoglycemics. 50 (67.6%) of all male patients were treated with insulin, and 62 (83.8%) with oral hypoglycemics, compared to 95 (62.9%), and 139 (92.1%) in females respectively. *Table 3* presents the age, duration, and complications of diabetes by BMI.

Discussion:

The prevalence of type 2 diabetes among Qatari's age 20-65 years is 15%⁽⁸⁾, and the number of new cases is increasing by age in both types⁽⁷⁾.

Diabetes mellitus in this sample of Qatari patients was mostly of type 2, which is the situation in most of the countries⁽⁹⁾.

Two thirds of the patients in this study had positive family history of diabetes, with a significantly higher number of diabetic fathers for females than males. Type 2 diabetes is known to be strongly familial, with some genes that had been consistently associated with increased risk for type 2 diabetes in cer-

Table 3: Age, Duration and Complications of diabetes by BMI

FACTORS	Normal BMI 18.5-24.9 N=32 (14.2%)	Overweight BMI 25-29.9 N=65 (28.9%)	Obese BMI ≥ 30 N=128 (56.9%)
Age			
≤ 45: (N = 51)	6 (11.8)	9 (17.6)	36 (70.6)
> 45: (N = 174)	26 (14.9)	56 (32.2)	92 (52.9)
Duration of Diabetes			
≤ 10: (N = 53)	4 (7.5)	12 (22.6)	37 (69.8)
> 10: (N = 172)	28 (16.3)	53 (30.8)	91 (52.9)
Complications			
Retinopathy	13 (40.6)	32 (49.2)	53 (41.4)
Nephropathy	10 (31.25)	24 (36.9)	58 (45.3)
Neuropathy	12 (37.5)	12 (18.5)	41 (32)
Hypertension*	13 (40.6)	3 (4.6)	67 (52.3)
Hyperlipidemia	12 (37.5)	16 (24.6)	32 (25)
CHD ^A	7 (21.9)	15 (23.1)	20 (15.6)
Others ^B	5 (15.6)	3 (4.6)	10 (7.8)

A = Coronary heart disease B = Thyroid problems, and foot ulcer

tain populations, however both types of diabetes are complex diseases caused by mutations in one gene or more in addition to environmental factors⁽⁹⁾. High family history among these patients might be due to high rates of marriage among relatives. Family history of diabetes is one of the important risk factor in development of complications. The high family history in these patients might have contributed to the high incidence of complications.

The prevalence of complications was high, especially for retinopathy, nephropathy, hypertension, neuropathy, hyperlipidemia, and coronary heart diseases. These results are in agreement with several reports^(3, 9,10).

These micro- and macroangiopathies, both were reported to account for a significant increase in the morbidity and mortality of diabetes mellitus type 1 and 2⁽¹¹⁾.

Intensive glycemic control can prevent the onset, and delay the progression of microvascular complications in diabetic patients⁽¹²⁾.

Males demonstrated higher prevalence of most of the complications, except for neuropathy and thyroid problems, which were significantly higher in females. The high prevalence of hypertension among these diabetic men, and the prevalence of some thyroid problems, which are known to be generally higher in females, might explain these results.

The high prevalence of obesity and overweight were also

reported, as nearly 80% to 90% of type 2 diabetics are obese in most parts of the world and more so for the GCC countries^(13,14).

This might be due to the rapid changes in the socioeconomic status and life style, which took place in the Gulf area over the past three decades.

There is strong evidence that an average weight reduction of 5-10% enhances improvement in glycemic control through one year⁽¹⁵⁾.

Higher prevalence of obesity than overweight in patients who had diabetes for 10 years or less might have predisposed to the development of the disease itself, while the lower prevalence of obesity than overweight for duration of more than 10 years might be due to dietary control, and physical activity which was reported to be higher in Qatar compared to other Gulf countries⁽¹⁶⁾. This might also be the situation for the age of patients, which follows similar pattern.

A strong association between obesity and development of hypertension was demonstrated in this study. Hypertension was reported to affect people with impaired glucose tolerance and diabetics more than normal people^(17,18). It also affects 20-60% of people with diabetes, depending on age, obesity, and ethnicity.

A study in Bahrain indicated that hypertension was reported in 21%, 31% and 38% of normal, glucose intolerance, and diabetic individuals, respectively⁽¹⁹⁾. In another study from Saudi Arabia, the prevalence of Hypertension was reported to be al-

most 50% in type 2 patients⁽²⁰⁾.

Hypertension in diabetic patients significantly increases the risk of coronary heart disease, nephropathy, and mortality; therefore, control of blood pressure can reduce the morbidity and mortality in diabetic patients type 2^(15,20).

Hyperlipidemia was higher in patients with normal body weight than with obese or overweight, which is in agreement with a study that reported high cholesterol levels in diabetics regardless of body weight, suggesting that diabetes modulates cholesterol metabolism more than obesity alone⁽²¹⁾.

Lowering of blood glucose levels would diminish cholesterol synthesis and increase cholesterol absorption; these could be seen after effective weight reduction in diabetic patients⁽²²⁾.

The high rate of use of insulin and oral hypoglycemic drugs might be attributed to the lack of diabetes education, which was found in more than half of the patients, failure to follow proper dietary system, and insufficient physical activity. Appropriate use of diet and exercise can improve insulin sensitivity and glycemic control and decrease the need for oral hypoglycemics or insulin^(23,24).

Conclusions:

This preliminary study pointed out high prevalence of complications, and some risk factors among a sample of Qatari diabetics. A study covering all Qatari diabetics, their dietary intakes, physical activity, and some of the risk factors is strongly recommended.

References:

1. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus: Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 25 (Suppl. 1): S 5-20, 2002.
2. Bajaj JS. Emerging Epidemic of Diabetes Mellitus. *West Indian Med. J.*; 50 (Suppl. 1): 15-16, 2001.
3. King H, Aubert RE, Herman WH. Global Burden of Diabetes, 1995-2025: Prevalence, numerical estimates, and projections. *Diabetes Care*; 21:1414-1431, 2001.
4. William R. The burden of Diabetes in the Next Millennium. *Diabetes Reviews International*; 7:21-23, 1995.
5. Alwan A, King H. Diabetes in the Eastern Mediterranean (Middle East Region): The World Health Organization Responds to a Major Public Health Challenge. *Diabetic Medicine*; 12:1057-8, 1995.
6. Diabetes Prevention and Control, A Call for Action. Alexandria, Egypt, The World Health Organization Regional Office for the Eastern Mediterranean, 1993.
7. Ministry of Public Health, Vital Statistics, Annual Report; 2001. Doha, Qatar 2001.
8. Qatar Diabetes Association; National Survey 1998-99; Diabetes Prevalence in Qatar, 2002.
9. The World Health Organization, Fact Sheet; Diabetes Mellitus. *Saudi Med J*; vol. 23 (5):612-15, 2002.
10. Gylling H, Miettinen TA. Cholesterol absorption, synthesis and low and high-density lipoprotein metabolism in non insulin-dependent diabetes mellitus. *Diabetes Care*; 20; 90-95, 1997.
11. Bajaj JS. Management of Diabetes Mellitus: Principles and Practice. *Kuwait Med J*; 34:94-105, 2002.
12. DCCT Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Eng J Med*; 329:977-86, 1993.
13. Abdella NA, Khogali MM, Salman AD, Ghunemi SA, Bajaj J.S. Pattern of non-insulin dependent diabetes mellitus in Kuwait. *Diab Res Clin Prac*; 29:129-36, 1995.
14. Mokdad AH, Bowman BA, Ford ES, Vinicor F, Marks JS, Koplan JP: The continuing epidemics of obesity and diabetes in the United States. *JAMA*; 285:1195-1200, 2001.
15. UK Prospective Diabetes Study Research Group. UK Prospective Diabetes Study 7: response of fasting plasma glucose to diet therapy in newly presenting Type 2 diabetic patients. *Metabolism*; 39:905-12, 1990.
16. Musaiger AO, Al Mulla AA. Food Frequency Intake and Lifestyle among Patients attending Outpatient Clinics in Qatar: A Preliminary Study. *Bahrain Med Bull*; 20 (3): 111-3, 1998.
17. Marr M, Berrut G. Hypertension and diabetes mellitus. *Biomed Pharmac*; 47:61-66, 1993.
18. Bangou-Bredent J, Szmidt V, Campier A, Pinget M. Cardiovascular risk factors associated with diabetes in an Indian community Guadelope: a case control study. *Diabetes Metab*; 25:393-98, 1999.
19. Al Mahroos F, Al Roomi K. Relation of high blood pressure to glucose intolerance, plasma lipids and educational status in an Arabian Gulf population. *Int J Epidemiol*; 29:71-76, 2000.
20. Al Zami M, Warsy A. Association of hypertension and non-insulin dependent diabetes mellitus in the Saudi population. *Annals of Saudi Medicine*; 21:5-8, 2001.
21. Simonen P, Gylling H, Miettinen TA. Diabetes Contributes to Cholesterol Metabolism Regardless of Obesity. *Diabetes Care*; 25(Nov 9): 1511-14, September 2002.
22. Simonen P, Gylling H, Howard AN, Miettinen TA. Introducing a new component of the metabolic syndrome: low cholesterol absorption. *Am J Clin Nutr*; 72:84-88, 2000.
23. Chandalia M, Garg A, Lutjohann D, vonBergmann K, Grungy SM, Brinkley LJ: Beneficial effects of high dietary fiber intake in patients with type 2 diabetes mellitus. *N Engl J Med*; 342:1392-98, 2000.
24. Horton Es: Exercise and diabetes mellitus. *Med Clin North Am*; 72:1301-21, 1988.