

# Frequency and Risk Factors of Diabetic Complications among Selected Group of Diabetic Patients: Real-life Scenario from a Developing Country, Bangladesh

Haque HF<sup>a</sup>, Mitra P<sup>b</sup>, Rahim MA<sup>c</sup>, Afroz F<sup>a</sup>, Afroze SR<sup>a</sup>, Ahmed AKMS<sup>d</sup>, Musa AKM<sup>e</sup>

## Abstract

**Background:** Diabetes mellitus is a major global public health problem and its complications like coronary artery disease (CAD), stroke, amputations, nephropathy and retinopathy are alarming public health issues. These complications result in significant morbidity, mortality and huge economic burden for the patient and society. This current study aimed to evaluate the frequency of different diabetic complications and their risk factors in a real-life setting.

**Methods:** This cross-sectional study was done in BIRDEM General Hospital from July to December 2015. Diagnosed adult diabetic patients of either sex irrespective of duration and type of diabetes were consecutively and purposively included in this study. Enrolled patients were evaluated clinically and by laboratory investigation.

**Results:** Total patients were 400 with female predominance (57.8%). Mean age was 54.5±10.9 years. Majority (57.5%) were from urban areas, 82% had hypertension and 37.5% had dyslipidaemia. Mean duration of diabetes was 11.6±7.6 years, mean body mass index was 24.6±4.5 kg/m<sup>2</sup>, mean HbA1c was 9.1±2.0%. Nephropathy (42.5%) was the commonest complication followed by retinopathy (37.8%), neuropathy (29.8%), CAD (25.8%), peripheral vascular disease (14%) and stroke (11%). Long duration (≥5 yrs) and poor control of diabetes (HbA1c ≥7%), family history of diabetes, hypertension, dyslipidaemia and male sex were significant risk factors for diabetic complications.

**Conclusions:** Complications of diabetes are common. Glycaemic control and control of hypertension, dyslipidaemia and weight management may halt or delay the development of complications of diabetes. Patient education is of paramount importance in this regard.

**Key words:** Bangladesh, complication, frequency, diabetes mellitus.

(BIRDEM Med J 2017; 7(2): 143-147)

---

## Author information

- Dr. Hasna Fahmima Haque, Farhana Afroz, Samira Rahat Afroze, Registrar, Internal Medicine, BIRDEM General Hospital, Dhaka, Bangladesh.
- Dr. Palash Mitra, Assistant Registrar, Nephrology, BIRDEM General Hospital, Dhaka, Bangladesh.
- Dr. Muhammad Abdur Rahim, Assistant Professor, Nephrology, BIRDEM General Hospital, Dhaka, Bangladesh.
- Dr. AKM Shaheen Ahmed, Associate Professor, Internal Medicine, BIRDEM General Hospital, Dhaka, Bangladesh.
- Prof. AKM Musa, Professor, Internal Medicine, BIRDEM General Hospital, Dhaka, Bangladesh.

**Address of correspondence:** Dr. Hasna Fahmima Haque, Registrar, Internal Medicine, BIRDEM General Hospital, Dhaka, Bangladesh. Email: drfahmimahaque@gmail.com

**Received:** October 28, 2016

**Accepted:** February 28, 2017

## Introduction

Diabetes mellitus (DM) is a major global health problem, affecting 415 million people and accounting for 5.0 million deaths in 2015.<sup>1-3</sup> By 2040 the number of affected people is expected to increase to 642 million globally.<sup>1-4</sup> Diabetes has become the seventh leading attributable risk factor for burden of disease in South Asian countries.<sup>5</sup> In the South Asian region, Bangladesh has the second largest number of adults with diabetes (7.1 million adults).<sup>1</sup> Diabetes is a chronic condition and diabetes-related complications like diabetic neuropathy, nephropathy, retinopathy and diabetic foot ulcer are now alarming public health

issues. These complications contribute to the decreased quality of life for affected individuals and their families with a devastating long-term effect on their financial and social wellbeing. The complications of DM are far less common and less severe in people who have well controlled blood glucose levels.<sup>6,7</sup> Diabetes mellitus is associated with 10 to 30% decrease in life expectancy mainly due to its complications and diabetic patients die at an earlier age than non-diabetics.<sup>8</sup> The present study was aimed to evaluate the frequency of complications among the selected group of diabetic patients in a tertiary care centre and to identify the risk factors responsible for the complications.

### Methods

This cross-sectional study was done in Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) from July to December 2015. Diagnosed adult diabetic patients of either sex, irrespective of duration of diabetes were evaluated in this study. Enrolled patients were evaluated clinically and by laboratory tests. Diabetes due to other cause, gestational diabetes, patients with a past history of neuropathy of another cause and patients with significant hepatic or renal disease were excluded. Body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters. Retinopathy was assessed by experienced ophthalmologists using a direct ophthalmoscope with dilated pupils. Peripheral neuropathy was assessed by clinical features, supplemented by monofilament testing. Peripheral vascular disease (PVD) was diagnosed based on clinical symptoms and examination. Nephropathy, stroke and coronary artery disease (CAD) were considered by previous records from diabetic guide book.

### Results

Total patients were 400 with female predominance (57.8%). Mean age was 54.5±10.9 years. Majority (57.5%) were from urban areas, 82% study population had hypertension and 37.5% had dyslipidaemia. Baseline characteristics of the study subjects are shown in Table I.

**Table I.** Base-line characteristics of the study population (n=400)

Characteristic	Value
Total Patient	400
Mean age (years)	55.18 ± 11.24
Male: female	169:231 (1:1.4)
Rural: urban:sub urban	98:230:72
Mean duration of diabetes (years)	11.6±7.6
Mean HbA1c (%)	9.1 ± 2.0
Mean BMI (kg/m <sup>2</sup> )	24.6±4.5

Nephropathy (42.5%) was the commonest complication followed by retinopathy (37.8%), neuropathy (29.8%), CAD (25.8%), PVD (14%) and stroke (11%) (Table II).

**Table II.** Diabetes specific complications among the study population (n=400)

Complication	Frequency	Percentage
<b>Microvascular</b>		
Nephropathy	170	42.5
Retinopathy	151	37.8
Neuropathy	119	29.8
<b>Macrovascular</b>		
Coronary artery disease (CAD)	103	25.8
Peripheral vascular disease (PVD)	56	14
Cerebrovascular disease (CVD)	44	11

Duration (≥5 yrs) and family history of diabetes, hypertension, dyslipidaemia and male sex were significant risk factors for diabetic complications (Tables III and IV).

**Table III.** Risk factors for diabetic microvascular complications (n=400)

Risk factor		Retinopathy	p value	Nephro pathy	p value	Neuropathy	p value
Duration of DM	<5 yr	3	0.000	3	0.000	11	0.002
	5-10 yr	37		50		44	
	>10 yr	111		117		64	
HbA1c	<7	12	0.104	24	0.119	12	0.730
	7 or more	139		146		107	
Dyslipidemia	Yes	55	0.671	59	0.281	52	0.110
	No	96		111		67	
HTN	Yes	130	0.054	154	0.000	101	0.268
	No	21		16		18	
BMI	<25	72	0.000	83	0.000	76	0.325
	25 or more	79		87		43	
Sex	Male	69	0.278	72	0.972	61	0.020
	Female	82		98		58	
Family H/O DM	Yes	75	0.678	90	0.506	70	0.042
	No	76		80		49	

**Table IV.** Risk factors for diabetic macrovascular complications (n=400)

Risk factor		CAD	p value	Stroke	p value	PVD	p value
Duration of DM	<5 yr	17	0.520	3	0.009	5	0.013
	5-10 yr	27		20		24	
	>10 yr	59		21		27	
HbA1c	<7	6	0.043	3	0.450	4	0.367
	7 or more	97		41		52	
Dyslipidemia	Yes	43	0.333	29	0.000	28	0.042
	No	60		15		28	
HTN	Yes	83	0.841	40	0.110	52	0.025
	No	20		4		4	
BMI	<25	56	0.346	22	0.365	29	0.451
	25 or more	44		19		24	
Sex	Male	55	0.010	27	0.007	32	0.015
	Female	48		17		24	
Family H/O DM	Yes	30	0.000	14	0.007	23	0.115
	No	73		30		33	

## Discussion

Diabetes mellitus has been recognized as a major public health problem with far reaching consequences, not only for its adverse health impact on individuals, but also for its economic burden on the health care system and society at large.<sup>9</sup> In this study, we analyzed the classical chronic complications of diabetes.

In our study, among microvascular complications, nephropathy was the most common complication which was not similar to the previous study from our country.<sup>10</sup> Here we found that, nephropathy was present in 42.5% of study subjects then retinopathy in 37.8%, neuropathy in 29.8%, CAD in 25.8%, PVD in 14% and stroke in 11%. But previous study from Bangladesh showed microvascular, macrovascular and severe late complications in 39.2%, 9.9% and 12.1% of patients respectively.<sup>10</sup>

It was seen from our study that microvascular complications were common among the study subject who had long duration of diabetes, hypertension, obesity and macrovascular complications were common among the patients with male sex, poor glycemic status, dyslipidemia and family history of DM. There are several study from India,<sup>11</sup> one showed neuropathy was more common (37%) when compared with retinopathy (17%) and nephropathy (20%). Microvascular complications were seen in 48% of their study population. Increasing age, long duration of diabetes, and higher HbA1c were the common risk factors for all complications.<sup>11</sup> Pradeepa R et al. of India also reported that neuropathy was the most common complication and age, glycosylated hemoglobin, duration of diabetes, serum triglycerides were responsible for that.<sup>12</sup> Abougambou SS et al. from Malaysia found that the prevalence rate of nephropathy was 91% followed by neuropathy in 54.7%, retinopathy in 39.3% and macrovascular complications in 17.5%. The vascular complications were significantly associated with the age ( $P < 0.001$ ), BMI ( $P < 0.001$ ), and triglyceride.<sup>13</sup> Study from Cameroon showed most common complication was neuropathy (40%) and occurrence of complications was associated with hypertension, duration of diabetes, dyslipidemia, microalbuminuria, 24-hour proteinuria, BMI and HbA1c.<sup>14</sup> In Ethiopia, chronic complications were present in 58.8% of diabetic patients. Among those visual disturbance was in 25.68% and neuropathy in 14.4% of patients.<sup>15</sup> Al-Maskari F of United Arab

Emirates found that prevalence of coronary artery disease was in 14.4%, peripheral vascular disease in 11.6%, cerebrovascular disease in 3.5% and along with diabetes, hypertension and dyslipidemia were the risk factors.<sup>16</sup>

Our study had several limitations. The study period was short and sample size of our study was small. It was a single centered study and data from other centers are required to represent the complications of diabetic patients in Bangladesh. Other limitation was the use of direct ophthalmoscopy instead of retinal photography in the assessment of diabetic retinopathy and for detection of neuropathy we did only clinical examination, we could do nerve conduction study and for PVD duplex study of lower limb vessels.

So, it can be concluded like that among the diabetic patients the frequency of complications were high. Increased occurrence of peripheral neuropathy, nephropathy and retinopathy were observed with longer duration of illness. Poor glycemic status, dyslipidemia, hypertension, obesity were the major risk factor along with DM. Diabetic patients need more efforts to be spent on them. Screening and intervention programs should be implemented early at the diagnosis stage and risk factors should be treated aggressively. If we can improve the current status of diabetic patients not only from tertiary care hospital but also from primary care centre, we hope to decrease the rate of frequency of vascular complications.

**Acknowledgement:** We express our acknowledgement to all our colleagues who have collected data from the study subjects for the study purpose.

**Conflict of interest:** None declared.

**Declaration:** This paper was presented in the 33rd World Congress of Internal Medicine, Bali, Indonesia, 2016.

## References

1. International Diabetes Federation. IDF Diabetes Atlas, 7 ed. Brussels, Belgium: International Diabetes Federation, 2015.
2. Danaei G, Finucane MM, Lu Y, Lu Y, Singh GM, Cowan MJ, et al. National, regional and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. *Lancet* 2011; 378: 31–40.
3. Mendis S, Puska P, Norrving B, World Health Organization, World Heart Federation, World Stroke Organization. Global

- atlas on cardiovascular disease prevention and control. Geneva: World Health Organization; 2011.
4. Guariguata L, Whiting D, Hambleton I, Beagley J, Linnenkamp U, Shaw J. Global estimates of diabetes prevalence for 2013 and projections for 2035 for the IDF Diabetes Atlas. *Diabetes Res Clin Pract* 2013; 100(2): 137-49.
  5. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2013; 380: 2224–60.
  6. Nathan DM, Cleary PA, Backlund JY, Genuth SM, Lachin JM, Orchard TJ, et al. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *N Engl J Med* 2005;353(25):2643- 53.
  7. The effect of intensive diabetes therapy on the development and progression of neuropathy. The Diabetes Control and Complications Trial Research Group. *Ann Intern Med* 1995; 122(8):561–68.
  8. Buse JB, Ginsberg HN, Bakris GL, Clark NG, Costa F, Eckel R, et al. Primary prevention of cardiovascular diseases in people with diabetes mellitus: a scientific statement from the American Heart Association and the American Diabetes Association. *Diabetes Care* 2007;30(6):162–72.
  9. Heisler M, Pletu JD, Spencer M, Kieffer E, Vijay S. The relationship between knowledge of recent HbA/c values and diabetes care understanding and self management. *Diabetes care* 2005; 28:816-22.
  10. Latif ZA, Jain A, Rahman MM. Evaluation of management, control, complications and psychosocial aspects of diabetics in Bangladesh: DiabCare Bangladesh 2008. *Bangladesh Med Res Counc Bull* 2011 Apr;37(1):11-16
  11. Kumar HKVS, Kota SK, Basile A, Modi KD. Profile of Microvascular Disease in Type 2 Diabetes in a Tertiary Health Care Hospital in India. *Ann Med Health Sci Res* 2012; 2(2): 103–108.
  12. Pradeepa R, Anjana RM, Unnikrishnan R, Ganesan A, Mohan V and Rema M. *Diabetes Technology & Therapeutics* 2010; 12(10): 755-61.
  13. Abougalambou SS, Mohamed M, Sulaiman SA, Abougalambou SA, Hassali MA. Current clinical status and complications among type2 diabetic patients in University Sains Malaysia hospital. *International Journal of Diabetes Mellitus* 2010 (2):184-88.
  14. Tamba SM, EwaneME, BonnyA, MuisiCN, NanaE, EllongA et al. *Pan African Medical Journal* 2013; 15:141.
  15. Abejew AA, Belay ZA, Kerie MW. Diabetic complication among adult diabetic patients of a tertiary hospital in North east Ethiopia. *Hindawi Publishing Corporation Advances in Public Health* ;Volume 2015, Article ID 290920, 7 pages. (accessed January 7, 2017).
  16. Maskari FA, Sadig ME, Norman JN. The prevalence of macrovascular complications among diabetic patients in the United Arab Emirates *Cardiovascular Diabetology* 2007; 6: 24.