



Original Article

Prevalence and risk factors of Type 2 diabetes in an urbanizing rural community of Bangladesh

M Akhtarul Islam¹, Khan MMR², PM Basak¹, MM Khanam³, AA Masum⁴

Abstract

This cross-sectional study was carried out to estimate the prevalence of type 2 diabetes mellitus and its' risk factors in an urbanizing rural community of Bangladesh. This study was carried out in my private practice chamber at Rohonpur, Chapai Nawabgonj District of Bangladesh. Rohonpur is an unbanning rural community of Bangladesh. Total 975 subjects (>20 years), were included following simple random procedure. This study was carried out in between 1st July 2015 to 31st December 2016. Capillary blood glucose levels, fasting blood glucose (FBG) levels and 2-hour after 75 g oral glucose load (OGTT) were measured. Height, weight, waist and hip circumferences and blood pressure were measured. The study population was lean with mean body mass index (BMI) of 20.48. The total prevalence of type 2 diabetes was 8.5%, men showed higher prevalence (9.4%) compare to women (8.0%). Increasing age and higher BMI were found to be significant risk factors following both FBG and OGTT. The study has shown that prevalence of diabetes has increased in the populations who are in transitional stage of urbanization, and may indicate an epidemiological transition due to fast expanding urbanization.

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Introduction

Type 2 diabetes mellitus poses a major global health threat, especially in the developed and developing countries¹. The increasing trend of type 2 diabetes is common in the developing nations and most common in Southeast Asian countries¹. Recent epidemiological studies have shown an increased prevalence of diabetes in India (11.6%), Pakistan (11.1%), Hawaii (20.4%), and Turkey (7.2%)²⁻⁵. It has been suggested that the increase in prevalence of diabetes among Asian Americans is due to ageing of the population, urbanization and increasing prevalence of obesity and physical inactivity⁶.

Some population based studies conducted in Bangladesh at different times have revealed an increasing trend of diabetes prevalence ranging from 1.0 to 3.8% in rural population and 1.5 to 8.0% in urban population⁷⁻⁹. Bangladeshis is more at risk to develop diabetes, hyperinsulinemia and coronary heart disease compared with other South Asian migrants settled in the UK¹⁰. It was reported that prevalence of type 2 diabetes is on the rise more in urban areas compared to rural population in Bangladesh^{9, 11}. Bangladesh is one of the developing countries in the world, which is facing rapid urbanization in recent time¹².

¹ Assistant Professor, Department of Medicine, Rajshahi Medical College.

² Associate Professor, Department of Medicine, Rajshahi Medical College.

³ Indoor Medical Officer, Obs & Gyanae, Rajshahi Medical College Hospital.

⁴ Indoor Medical Officer, Dept. of Internal Medicine, BSMMU, Dhaka.

Material and Methods

This cross sectional study was carried out in a private practice chamber at Rohonpur, Chapai Nawabgonj District of Bangladesh. Rohonpur is an urbanizing rural community of Bangladesh. Total 975 subjects (≥ 20 years) were included following simple random procedure. Among 975 subjects 360 were male and 615 were female. This study carried out in between 1st July, 2015 to 31st December 2016. Fasting blood glucose from capillary whole blood was performed following the new WHO criteria. All subjects were then given a 75 gm oral glucose solution to drink for a 2-hours post glucose challenge test. Anthropometrics measurement for height, weight, hip and waist circumferences were taken. Body mass index (BMI) was calculated as weight in kg/height in m² and Waist to hip (WHR) was taken

as waist/hip circumferences. Blood pressure was measured two times 10 minutes interval for each patients. All statistical analysis were performed by SPSS 16 version software. The prevalence rate of diabetes was determined by simple percentage. Statistical Comparisons between different groups were made using χ^2 test.

Results

Among the 975 participants, 31% were males and 63% were females. Table I shows the selected characteristics of the study subjects. The majority of the subjects were young; however, the proportion of young among the males was lower than the females and the proportion that were older (50+) were more among the males than females. Regarding

Table I: Selected socio-demographic characteristics of the sample populations

Characteristics	Male (n= 360)	Female (n= 615)	Total (n= 975)
Age group in years			
20-30	108	252	360
31-40	94	177	271
41-50	62	80	142
50+	96	106	202
Mean age	41.7	37.3	
Education			
Literate	290	525	815
Illiterate	70	90	160
Occupation			
Student	80	40	120
Service	110	100	210
Business	120	35	155
House wife		375	375
Others	50	65	115
Monthly income in Taka			
< 5,000	175	480	655
> 5,000	185	135	320

Table II shows the differences of mean values with + SD and their P values between males and females for anthropometric and clinical characteristics. The mean age, height, weights, waist circumference, WHR

were significantly higher ($p < 0.001$) for males than the females and the mean values of 2-hour post glucose test were considerably higher among the females compare to males.

The prevalence of diabetes in males and females were 9.4% and 8.0% and the prevalence of impaired fasting glycaemia was 3.9% and 5.2% respectively following fasting blood glucose values. The higher prevalence of diabetes was found among the higher age group for both males and females. The male had higher prevalence of diabetes among the older subjects compare to females (Table III). The prevalence of impaired glucose tolerance increased consistently with increasing age among the females. The total prevalence of diabetes in males is slightly higher than females although the increased prevalence of impaired glucose tolerance was noted among the females compared to male subjects following OGTT (Table III).

Table II: Mean values (SD) for anthropometric and clinical variables of the study subjects

Variables	Male (n=360) Mean (SD)	Female (n=615) Mean (SD)	P value
Anthropometric variables			
Height in cm	161.74 (6.89)	150.74 (6.24)	0.00
Weight in kg	53.74 (9.90)	46.58 (8.57)	0.00
Waist circumference in cm	74.81 (9.35)	71.88 (9.52)	0.00
Body mass index (BMI), wt in kg/ht m ²	20.48 (3.20)	20.48 (3.44)	0.97
Waist to hip ratio (WHR)	0.88 (0.06)	0.84 (0.06)	0.00
Clinical variables			
Systolic blood pressure (mm Hg)	120.14 (19.77)	119.99(18.75)	0.90
Diastolic blood pressure (mm Hg)	77.39 (11.81)	77.40 (11.56)	0.99
Fasting blood glucose (FBG) mmol/l	5.02 (3.29)	4.91 (1.38)	0.52
2-hour post glucose test (OGTT) mmol/l	5.71 (3.12)	6.10 (2.88)	0.05

Table III: Prevalence of diabetes and other abnormal glucose conditions following fasting blood glucose and 2-hour post glucose test by age and sex

Age group	Fasting blood glucose		2-hour post glucose test	
	Prevalence in diabetes (95% CI)	Prevalence in impaired fasting glucose (95% CI)	Prevalence in diabetes (95% CI)	Prevalence in impaired fasting glucose (95% CI)
Male				
20-30	2.8 (0.5-7.9)	2.8 (0.6-7.9)	1.9 (0.2-6.5)	3.7 (1.0-9.2)
31-40	8.5 (3.7-16.1)	2.1 (0.3-7.5)	6.4 (2.4-13.4)	7.4 (3.0-14.7)
41-50	8.1 (2.7-17.8)	3.2 (0.4-11.2)	6.5 (1.8-15.7)	3.2 (0.4-11.2)
51->	18.8 (11.5-28.0)	7.3 (3.0-14.4)	9.4 (4.4-17.1)	11.5 (5.9-19.6)
Total	9.4 (6.6-12.9)	3.9 (2.1-6.4)	5.8 (3.6-8.8)	6.7 (4.3-9.8)
Female				
20-30	3.6 (1.6-6.7)	3.6 (1.6-6.7)	0.8 (0.1-2.8)	7.5 (4.6-11.5)
31-40	13.0 (8.4-18.9)	3.4 (1.3-7.2)	8.5 (4.8-13.6)	6.8 (3.6-11.5)

41-50	7.5 (2.8-15.6)	5.0 (1.4-12.3)	3.8 (0.8-10.6)	12.5 (6.2-21.8)
51->	10.4 (5.3-17.8)	12.3 (6.7-20.1)	6.6 (2.7-13.1)	17.9 (11.2-26.6)
Total	8.0 (6.0-10.4)	5.2 (3.6-7.3)	4.4 (2.9-6.3)	9.8 (7.5-12.4)

Discussion

We have observed a higher prevalence (8.5%) of type 2 diabetes among the rural subjects. We have found the higher prevalence of diabetes among the males (9.4%) compare to females (8.0%) but the differences were not statistically significant. This prevalence rate in the rural population is noticeably higher than in the previous studies in Bangladesh^{13,14}. It is also higher than the rural prevalence of China (2.5%), Mongolia (2.9%) and India (2.4%)¹⁵⁻¹⁷.

The recent report of urban Indians showed that there was 40% increase in type 2 diabetes from 8.2% in 1988 to 11.6% in 1995². Urban studies in Bangladesh have also shown increasing prevalence of diabetes in 1996 (7.9%) and in 2000 (8.1%)^{8,11}. This may suggest that the observed results are in feared concordance with other studies in India^{20, 2} and Bangladesh⁸.

The present study showed the higher prevalence of diabetes among the younger women in age strata 20-40 years compared to male subjects. The findings of the female predominance at younger age are inconsistent with the previous study conducted in Bangladesh⁸. Obesity is an established risk factor for type 2 diabetes, we found a significant association between higher BMI >25.00 and occurrence of diabetes in our survey. Data from previous studies showed a marginal risk for type 2 diabetes with higher BMI for both sexes in Bangladesh²¹. An Indian study has also shown that higher BMI is independently associated as risk for the occurrence of type 2 diabetes among men and women².

Conclusion

Higher age and higher BMI was significantly associated for the development of diabetes in our population but in bivariate model the central obesity and hypertension showed significant association. The higher prevalence in the present

study indicates the environmental factors may encompass a strong role for the rising prevalence of diabetes in urbanizing population in a developing country like Bangladesh. FBG showed higher prevalence compare to OGTT in our population. In this context we can say FBG is suitable diagnostic tools for diagnosis of diabetes in epidemiological study rather than OGTT.

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All corresponds to
Md. Akhtarul Islam
Assistant Professor
Department of Medicine
Rajshahi Medical College.
Rajshahi, Bangladesh