Original Article

IN BANGLADESH DIABETES STARTS EARLIER NOW
THAN 10 YEARS BACK: A BIRDEM STUDY

Parvin Akter Khanam[1], Hajera Mahtab[1], Ashraf Uddin Ahmed[2], M. Abu Sayeed[3] and A K Azad Khan[1]

[1]Department of Epidemiology and Biostatistics, Research Division, BIRDEM
[2]Department of Biochemistry, BIRDEM
[3]Department of Community Medicine, Ibrahim Medical College

Abstract

BIRDEM is the largest referral center of diabetes in the world. It registered more than 300,000 diabetic patients from 1956 to 2005. This retrospective study compared the biophysical characteristics of diabetic patients registered in 1995 to those registered in 2005. Information on social (income, education), clinical (height, weight, blood pressure) and oral glucose tolerance (OGTT) of patients registered in 1995 and 2005 were retrieved from the BIRDEM registry. The age group $\geq 20y$ was considered eligible. Overall, there were 11489 patients for 1995 and 19580 for 2005. Compared with the registry of 1995, a significant increase of registry for female patients were observed (39.5 vs. 46.7%, $p < 0.001$) and also the rural population (31.9 vs. 47.4%, $p < 0.001$). Likewise, the number of poor social class was also found higher in 2005 (5.2 vs. 25.5%, $p < 0.001$). Young aged ($< 40y$) registry was also significantly higher in 2005 (34.4 vs. 37.1%, $p < 0.001$). Compared with the registered patients of 1995, adjusted for sex and area, those of 2005 had a significantly higher BMI, higher FPG and higher 2hPG (for all, $p < 0.001$). In contrast, a significantly lower age, lower height and lower blood pressure were observed in those of 2005. We conclude that the age at registration for diabetes has decreased significantly in 2005 compared to that in 1995 indicating an earlier onset of diabetes. Significantly higher obesity in the year 2005 than 1995 indicates that there has been an increase in obesity that might be an important contributing factor for earlier onset of diabetes.

Introduction

The prevalence of type 2 diabetes mellitus (T2DM) is on the increase worldwide. This increase has also been reported in Bangladesh[1-3]. Additionally, there are reports indicating an increased number of registrations at BIRDEM, a central referral center of Bangladesh situated in Dhaka. This is known to be the largest referral center of diabetes in the world. Since the establishment of BIRDEM in 1956 the cumulative frequency of registration was 1,185, 26,349 and 221,166 respectively in 1960, 1980 and 2000[4-6]. The registration of diabetic subjects includes social, anthropometric, clinical and biochemical information. It may be noted that more than 1600 diabetic patients visit BIRDEM daily for follow up. This retrospective study compares the biophysical characteristics of diabetic patients registered in 1995 to those registered in 2005.

Materials and Methods

When a patient is suspected of having diabetes, s(he) is usually referred to BIRDEM. The referral system is maintained not only for Dhaka but for almost all of Bangladesh. During registration each patient is interviewed with regard to social and demographic information. The variables are age, sex, family income, education, occupation and area of residence, height and weight and calculated body mass index (BMI). Systolic and diastolic blood pressure is also

Address for Correspondence:
Dr. Parvin Akter Khanam, Sr Research Officer, Dept. of Epidemiology & Biostatistics, Research Division, BIRDEM

taken. Two-sample oral glucose tolerance (OGTT, WHO criteria) of each patient is undertaken for confirmation of diabetes. All information of the registered patients is preserved in computer using the SPSS package. These records of the diabetic patients registered in 1995 and 2005 were retrieved for analytical purposes.

Statistical analyses – All the categorical data were expressed in percentages and all the quantitative data were shown in mean with standard deviation. The comparisons were made between rural diabetic men and women of 1995 with those of 2005. Urban men and women were compared with their counterparts. Student's t-test was applied for quantitative and Chi-sq was used for categorical data. SPSS 11.5 was used for all analyses. All statistical analyses were considered significant at 5% level.

Results

A total of 30,588 diabetic subjects were investigated. 56% were males and 44% were females. Of them, 11671 (M= 7062, F= 4609) diabetic subjects were taken from 1995 and 18914 (M= 10077, F= 8837) were taken from 2005.

Biophysical characteristics between 1995 and 2005: Table 1 shows the comparison of rural men and women of 1995 with their counterparts of 2005. Similar comparisons were made for urban and women of 1995 with those of 2005 (Table 2). Thus, adjusted for sex and area, compared with the registered patients of 1995, those of 2005 had a significantly higher BMI, higher FPG and higher 2hPG (for all, p < 0.001). In contrast, significantly lower age, lower height and lower blood pressure were observed in those of 2005.

The registration of women increased from 39.5% in 1995 to 46.7% in 2005 (p < 0.001) (Table 3). Likewise, the registration from rural diabetics had also increased (31.9 vs. 47.4%, p < 0.001). Again, compared with 1995, the registration from poor class increased manifolds in 2005 (5.2 vs. 25.5%, p < 0.001). More interesting finding was that the diabetes registration from lower age (< 40y) group had increased in 2005 than in 1995 (37.1 vs. 34.4 %, p < 0.001). The prevalence of obesity (BMI > 22.0) and insulin treatment at the time of registration was found significantly higher in 2005 than that of 1995.

Table-1. *Comparison of characteristics between 1995 and 2005 for rural men (n: 1995/2005= 2093/4344) and women (n: 1995/2005= 1232/3590)*

| | Rural men | | | | | Rural women | | | | |
| | 1995 | | 2005 | | | 1995 | | 2005 | | |
Characteristics	Mean	SD	Mean	SD	p	Mean	SD	Mean	SD	p
Age (y)	48.7	13.1	47.4	12.5	.000	48.7	12.5	45.8	12.1	.000
Height (cm)	162.8	6.4	162.1	6.3	.000	150.9	6.3	150.3	5.8	.002
Weight (kg)	56.0	11.5	58.6	11.2	.000	51.3	11.4	53.6	11.1	.000
BMI	21.1	4.1	22.2	3.8	.000	22.4	4.6	23.7	4.5	.000
SBP (mmHg)	121.4	18.2	121.3	16.7	.722	126.4	19.6	123.3	16.9	.000
DBP (mmHg)	78.2	9.22	78.9	8.8	.007	80.4	9.2	79.2	8.9	.000
FPG (mmol/L)	12.8	5.82	12.8	5.5	.821	12.6	5.3	12.8	5.4	.549
2h PG (mmol/L)	19.8	6.8	20.9	7.1	.000	20.1	6.9	21.3	7.5	.000

BMI – body mass index (wt kg/ ht met sq.) FPG – fasting plasma glucose, 2-hPG – plasma glucose 2 hour after glucose load.

Table-2. *Comparison of characteristics between 1995 and 2005 for urban men (n: 1995/2005= 4320/4730) and women (n: 1995/2005= 2895/4236)*

| | Urban men | | | | | Urban women | | | | |
| | 1995 | | 2005 | | | 1995 | | 2005 | | |
Characteristics	Mean	SD	Mean	SD	p	Mean	SD	Mean	SD	p
Age (y)	47.2	11.0	47.0	10.9	.336	45.5	11.6	44.8	10.9	.012
Height (cm)	164.5	6.4	163.3	6.2	.000	152.1	6.2	151.2	5.5	.000
Weight (kg)	62.7	10.2	63.8	10.3	.000	58.1	10.7	59.4	11.0	.000
BMI	23.1	3.4	23.8	3.3	.000	25.1	4.3	25.9	4.3	.000
SBP (mmHg)	126.0	17.3	123.4	15.5	.000	129.2	18.1	125.3	16.6	.000
DBP (mmHg)	81.3	9.0	80.7	8.7	.002	82.5	9.9	80.6	8.7	.000
FBG (mmol/L)	11.2	4.5	11.9	4.9	.000	11.0	4.3	11.6	5.0	.000
2-h PG (mmol/L)	18.7	6.1	19.6	6.6	.000	18.4	6.1	19.7	6.9	.000

BMI – body mass index (wt kg/ ht met sq.) FPG – fasting plasma glucose, 2-hPG – plasma glucose 2 hour after glucose load.

Table-3. *Comparison of variables between subjects registered in 1995 and 2005.*

Variables	**1995**	**2005**	***p***
Sex			
Men / women (%)	60.5 / 39.5	53.3 / 46.7	< 0.001
Area			
Rural / urban (%)	31.9 / 68.1	47.4 / 52.6	< 0.001
Social class			
Low / high (%)	5.2 / 94.8	25.5 / 74.5	< 0.001
Age (y):			
≤ 40 / > 40 (%)	34.4 / 65.6	37.1 / 62.9	< 0.001
Obesity (BMI)			
< 22.0 / ≥22.0 (%)	38.9 / 61.1	31.0 / 69.0	< 0.001
SBP (mmHg)			
≤ 140 / > 140 (%)	87.9 / 12.1	91.6 / 8.4	< 0.001
DBP (mmHg)			
≤ 90 / > 90 (%)	91.0 / 9.0	93.4 / 6.6	< 0.001
FPG (mmol/L)			
< 11.0 / ≥11.0 (%)	52.0 / 48.0	49.7 / 50.3	< 0.001
Treated with insulin			
Yes / No (%)	11.0 / 89.0	33.7 / 66.3	< 0.001

Data are given in percentages; P values are given after Chi sq. SBP, DBP – systolic and diastolic blood pressure

Discussion

In this analysis it was observed that the total number of registration had increased 160% from 1995 to 2005. This figure is consistent with previous studies, both population based[1-3] and registration based[4,5]. In the past, on or before 1995, more than two-thirds of the diabetic subjects were urban[4,5] indicating a higher prevalence in the urban than in the rural population. In contrast, the registration in 2005 showed that the previous proportion was no longer maintained. More and more diabetics were registered from the rural community and it had increased from 31.9% in 1995 to 47.4% in 2005. It appears that there was either an increased awareness or increased prevalence in the rural communities that lead to an increased referral to BIRDEM. The alarming finding was that there had been an increasing number of registrations from the younger group. This indicates that the onset of diabetes probably starts earlier in recent years than in the past. Obesity has also increased, which may be a contributory factor for early development of diabetes in Bangladesh. This finding is consistent with other studies[9-11]. These studies observed that obesity starts in childhood and adolescence that prompts development of diabetes at an earlier age. Possibly, Bangladesh is experiencing the same transition. The obesity starts early and the abnormal fat distribution in younger age contribute to develop diabetes or glucose intolerance at a much younger age. However, this is a speculation. A population based study in the younger age group may help explain these findings.

The registration from rural areas has also increased in 2005. It was reported that severe glycemia and proteinuria were registered from the rural population[6]. As already discussed, very few diabetic patients were registered at BIRDEM from rural community although 70% of Bangladeshis live in the rural area[7]. However, the policy makers should keep in mind that there is a possibility of undetected diabetes cases in the rural community and their number is not negligible.

Conclusions

In conclusion, compared with 1995 the number of registration has increased in 2005. The registration from female and rural population and from poor class has increased in 2005 than seen in 1995. More interesting finding is that the diabetes registration from lower age group (age < 40y) has increased in 2005. Significantly higher obesity in the year 2005 than 1995 indicates that there has been an increasing obesity that might be an important contributing factor for an earlier onset of diabetes.

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