A Cross Sectional Study on Some Risk Factors for Diabetes across Different Family History Groups in Bangladesh

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ABSTRACT- *The aim of this study was to compare and find out the prevalence of some risk factors for diabetes among distinct groups based upon family history. A total of 540 adult patients over 24 years and belonging to both genders were surveyed for the prevalence of some risk factors for diabetes. This was a cross sectional study and the data was collected through interviews with a structured questionnaire as well as recorded data of each patient. The study was conducted in National Health Care Network (NHN), Mirpur, Dhaka-1216 and Bangladesh Institute of Research & Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM), Dhaka, Bangladesh. Different clinical as well as generalized information including their name, address, sex, age, weight, height, monthly expense, blood pressure, fasting blood glucose, blood glucose after meal, cholesterol, serum creatine, triglyceride, low density lipoprotein, high density lipoprotein, SGPT, HbA1c, other related complications and drugs prescribed were recorded for further analysis. Age, obesity, fasting blood glucose (FBG), blood glucose after breakfast (ABF), triglyceride, high density lipoprotein (HDL) and HbA1c were found to be associated in a risk level for thy study subjects. Dietary modifications, physical activity and oral medicines may maintain adequate glycaemic control but in many times patients may also require insulin.*

Keywords--- Diabetes, Risk factors, Family history

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1. INTRODUCTION

Diabetes mellitus is a heterogeneous group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both . Diabetes Mellitus (DM), was longly considered as a minor significant disease to World Health, but now taking main threats to human health in the 21 [1st] century [1, 2]. The majority of the patients with diabetes in developed countries are above age 64. In developing countries, the majority of people with diabetes are in the 45-64 age groups [3]. Age, gender, occupation, physical activity, family history, diet, tobacco use, and systolic blood pressure showed statistically significant correlation with diabetic status level [4].

In a study of 100 patients, it is found that 40 (40%) had no diabetes complications, while the rest of 60 (60%) patients had different kinds of complications [5]. Over time, diabetes can increase the risk of health-related problems including blindness, kidney damage, nerve damage, amputation of lower limbs and cardio vascular disease [6]. Although diabetes cannot be cured, the disease can be managed by non-pharmacological and pharmacological strategies, where improvements in glycaemic control are important factors in delaying the onset and progression of diabetes-related complications [7].

2. SUBJECTS & METHODS

2.1 Study design

This was a cross sectional study, that was attempt to find out and compare some common risk factors for diabetes among three family history groups. The data was collected through interviews with a structured questionnaire as well as recorded data of each patient.

2.2 Study population

All treated male and female patients of diabetes diagnosed by the hospital physicians were included in this study and interviewed as per questionnaire. The patients were above 24 years and most are female belonging housewife. Total sample were 540.

2.3 Data collection and Statistical analysis

Different clinical as well as generalized information including their name, address, sex, age, weight, height, monthly expense, blood pressure, fasting blood glucose, blood glucose after meal, cholesterol, serum creatine, triglyceride, low density lipoprotein, high density lipoprotein, SGPT, HbA1c, other related complications and drugs prescribed were recorded for further analysis. Data were organized, tabulated and aggregated using Microsoft excel. Means and standard deviation of the physical and clinical parameters were find out and compare amongst the study population. The concomitant diseases and drugs prescribed were found by oral counting.

3. RESULTS

3.1 Overview of the family history on the study subjects:

Among the patients we found that about 46% patients whose family history had also reported diabetes and 51% diabetes patients showed no records of diabetes of their family history while 3 % of population did not know about their family records whether they had diabetes or not.

3.2 Observation of age, gender and profession among the study subjects:

We found that patients whose had the records of the exposure of diabetes previously of their family members tends to develop diabetes earlier than other groups who did not have family history of diabetes by about 7 years. The gender variation actually was not varied in diabetes development in our study. However, patients whose occupations were unorganized patterns were more prone to diabetes mellitus than organized jobs. The data has been shown in Table 1.

Table: 1 age, gender and profession of the study subjects:

Group		Yes 247	No 276	Not detected 17
Age	Mean (SD)	47.81 (±8.52)	54.03 (±12.91)	57.29 (±7.89)
Sex	Female (%)	194 (±78.54)	214 (±77.53)	16 (±94.12)
	Male (%)	53 (±21.46)	62 (±22.47)	1 (±5.88)
Profession	Organized (%)	34 (±13.76)	11 (±3.90)	Not Detected
	Unorganized (%)	177 (±71.66)	210 (±76.09)	17 (±100)
	Private sector (%)	32 (±12.96)	34 (12.32)	Not Detected
	Not identified (%)	4 (±1.62)	21 (±7.61)	Not Detected

3.3 Observation of body mass index (BMI) kg/m^2 and blood pressure (BP) mm/Hg of the study subjects:

Our study showed that BMI actually was not varied according to their family records of diabetes among patients that shown in figure 2.

Table: 2 BMI and BP of the study subjects:

Category	Yes 247	No 276	Not detected 17
Mean BMI (SD)	26.92 (±3.67)	26.11 (±3.26)	26.86 (±5.02)
Mean SBP (SD)	120.84 (±14.57)	122.82 (±11.98)	123.53 (±9.67)
Mean DBP (SD)	79.16 (±14.58)	80.04 (±5.42)	80 (±3.43)

3.4 Observation of fasting blood glucose mmol/l (FBG), blood glucose after breakfast mmol/l (ABF) and serum creatinine mg/dl of the study subjects:

Although ABF and FBG were remain similar in the patients having positive or negative response of family history, creatinine levels were slightly higher in those patients had no previous family history of diabetes as shown in table 3.

Table: 3 FBG, ABF and serum creatinine of the study subjects:

Category	Yes 247	No 276	Not detected 17
Mean FBG (SD)	9.75 (±2.89)	9.27 (±2.78)	10.83 (±2.88)
Mean ABF (SD)	14.75 (±39.70)	14.51 (±3.99)	15.65 (±4.41)
Mean S. creatinine (SD)	0.93 (± 0.23)	1.30 (±4.81)	1.07 (±0.36)

3.5 Observation of cholesterol mg/dl, triglyceride mg/dl and serum glutamic pyruvate transminase (SGPT) among the study subjects:

These parameters actually did not vary among the population as shown in table 4.

Table: 4 cholesterol, triglyceride and glutamic pyruvate transminase of the study subjects:

Category	Yes 247	No 276	Not detected 17
Mean Chol (SD)	188.20 (±33.39)	187.77 (±45.14)	196.64 (±45.54)
Mean TG (SD)	193.76 (±57.22)	196.77 (±100.03)	251.64 (±138.54)
Mean SGPT (SD)	28.89 (±8.85)	30.67 (±13.34)	123.88 (±364.71)

3.6 Observation of low density lipoprotein (LDL) mg/dl, high density lipoprotein (HDL) mg/dl and HbA1c among the study subjects:

Among the population LDL, HDL and HbA1c parameters were actually not varied in different groups as shown in table 5.

Table: 5 LDL, HDL and Hba1c of the study subjects:

Category	Yes 247	No 276	Not detected 17
Mean LDL (SD)	114.80 (±29.64)	117.88 (±22.00)	120.87 (±8.39)
Mean HDL (SD)	40.85 (±7.80)	40.69 (±5.44)	35.40 (±4.24)
Mean HbA1C (SD)	8.63 (±1.69)	8.49 (± 0.99)	9.35 (±1.26)

3.7 Observation of concomitant diseases among the study subjects:

We found that diabetes patients are more susceptible to affect other diseases and among them the most prevalent is hypertension. Other diseases include stroke, renal impairment, urinary tract infection and arthritis. The list of the diseases and their prevalence has shown here in table 6.

Table: 6 Concomitant diseases of the study subjects:

Diseases	Yes (247)	No (276)	Not detected (17)
Hypertension (%)	154 (62.35%)	192 (69.56%)	10 (58.82%)
Dyslipidemia (%)	110 (44.53%)	118 (42.75%)	5 (29.41%)
Heart disease (%)	14 (5.67%)	18 (6.52%)	1 (5.88%)
Kidney disease (%)	4 (1.62%)	9 (3.26%)	3 (17.65%)
Urinary tract infection(%)	29 (11.74%)	17 (6.16%)	2 (11.76%)
Arthritis (%)	8 (3.24%)	20 (7.25%)	0 (0%)
Not detected(%)	19 (7.69%)	16 (5.80%)	2 (11.76%)

3.8 Observation of prescribed drugs among the study subjects:

We found that the most prescribed drug was Metformin among the surveyed population, Gliclazide and Glimperide were about in same prevalence while pioglitazone was used by a less number of patients. Table 7 illustrates the details of the drugs we found in our study.

Table : 7 Prescribed drugs of the study subjects:

Drugs	Yes (247)	No (276)	Not detected (17)
Metformin hydrochloride	155 (62.75%)	147 (53.26%)	9 52.94%)
Gliclazide	90 (36.44%)	133 (48.19%)	6 (35.29%)
Glimepiride	67 (27.13%)	69 (25%)	5 (29.41%)
Pioglitazone hydrochloride	15 (6.07%)	24 (8.69%)	1 (5.88%)
Isophane insulin	54 (21.86%)	68 (24.64%)	7 (41.78%)
Fenofibrate	73 (29.55%)	50 (18.12%)	3 (17.65%)
Atorvastatin	128 (51.82%)	133 (48.19%)	9 (52.94%)
Losartan potassium	74 (29.96%)	79 (28.62%)	6 (35.29%)
Amlodipine	30 (12.14%)	43 (15.58%)	0
Atenolol+amlodipine	29 (11.74%)	48 (17.39%)	2 (11.76%)
Omeprazole	88 (35.65%)	89 (32.25%)	5 (29.41%)
pantoprazole	56 (22.67%)	59 (21.38%)	2 (11.76%)
Calcium+vitamin D	115 (46.56%)	167 (60..51%)	10 (58.82%)

4. DISCUSSION

4.1 Overview of the family history on the study subjects;

Total subjects were 540. Among them family history of diabetes was present in 247 (45.74%), absent in 276 (51.11%) and family history not detected is 17 (3.15%). *Flores et al (2003)* also reported that first degree relatives are 3 folds more related with type 2 diabetes than the individual without positive family history [8]. The prevalence of family history of diabetes in this study subjects is lower than the No group.

4.2 Observation of age, gender and profession among the study subjects:

The study indicates that the not detected groups are more aged (57.29 yrs) than the no group (54.03 yrs) and yes group (47.81 yrs). The average age of the study subjects is 53.04 years. *King H.et al (1998)* reported that, the majority of people with diabetes in the developing countries are in the 45-64 year age range [9]. Our result is within this report. On the other hand, female subjects are more than the male and most of them are involved in unorganized sectors.

4.3 Observation of body mass index (BMI) and blood pressure of the study subjects:

The mean BMI among three study groups is 26.92 kg/m^2, 26.11kg/m^2 and 26.86kg/m^2 respectively. The average BMI is 26.63kg/m^2. *Maskarinec et al (2009)*, reported that diabetes prevalence were 9.1%, 10.7%, 19.7% and 30.1% for under weight(<18.5kg/m^2), normal weight(18.5-24.9kg/m^2), overweight(25-29.9kg/m^2) and obese(>30kg/m^2) respectively [10]. On the other hand, according to *Jefferymartin et al (2008)* classification of BP (normal; SBP <120 and DBP <80, preliminary; SBP 120-139 and DBP 80-89, stage 1; SBP 140-159 and DBP 90-99 and stage 2; SBP >160 and DBP >100 mm/Hg). our study subjects are in average preliminary stages of hypertension (SBD; 122.39mm/Hg and DBP; 79.73mm/Hg) [11].

4.4 Observation of fasting blood glucose mmol/l (FBG), blood glucose after breakfast mmol/l (ABF) and serum creatinine mg/dl of the study subjects:

In this study, the mean fasting blood glucose (FBG) of the three groups are 9.75 mmol/l, 9.27 mmol/l and 10.83 mmol/l respectively. On the other hand, the mean blood glucose after breakfast among three groups are 14.75mmol/l, 14.51mmol/l and 15.65mmol/l respectively. According to *WHO(1999),* the study subjects have higher FBG as well as ABF than normal (FBG<7.0 and ABF<11.1 mmol/L) [12]. Other way, serum creatinine level is normal (0.6-1.4mg/dl) among the three groups.

4.5 Observation of cholesterol mg/dl, triglyceride mg/dl and serum glutamic pyruvate transminase (SGPT) among the study subjects:

In our study, the yes, no and not detected groups has lower cholesterol than 200 mg/dl and are in normal range (cholesterol level <200: normal, 200-250: borderline high and >250 risk). *Paul S. Jellingjer et al (2012)* classify elevated triglyceride level as normal: <150mg/dl, borderline high: 150-199mg/dl , high: 200-499mg/dl and very high >500 mg/dl [13]. According to this the yes and no groups are in borderline high but the not detected group is in high range. Otherway, the yes and no groups has normal (<34 U/L for female and <45 U/L for male) SGPT level but the not detected group has a higher SGPT (123.88 U/L) than other two groups.

4.6 Observation of low density lipoprotein (LDL) mg/dl, high density lipoprotein (HDL) mg/dl and HbA1c among the study subjects:

According to *The Expert Panel (2002)* the most common LDL cholesterol level in diabetes is "borderline high" 130-159 mg/dl [14]. But our study subjects have normal LDL cholesterol < 130 mg/dl. But , HDL cholesterol levels are low among the study subjects as low HDL is defined as levels of <40mg/dl (men) or<50 mg/dl (women) [15]. On the other hand, all of the three groups have higher level of HbA1c than the target level for diabetes (< 7.0%) [16].

4.7 Observation of concomitant diseases among the study subjects:

Among the study subjects 154 (62.35%) of Yes group, 192 (69.56%) of No group and 10 (58.82%) of Not detected group has hypertension. *Fiona et al (2010)* showed in a study that out of 449 subjects 121 (26.9%) has hypertension [17]. In this case, more of our study subjects have hypertension that is greater than *Fiona et al (2010)* study. On the other hand, 110 (44.53%) of yes group, 118 (42.75%) of No group and 5 (29.41%) of Not detected group has dyslipidemia. The prevalence of hypertension and dyslipidemia among the three groups of diabetic patients are much higher than the other diseases.

4.8 Observation of prescribed drugs among the study subjects:

Metformin was found to be prescribed in highest amount 155 (62.75%), 147 (53.26%) and 9 (52.94%) respectively among the Yes, No and Not detected groups. Gliclazide,glimepiride and pioglitazone were also seen to be prescribed but in less than metformin. Isophane insulin was also prescribed for many subjects. Fenofibrate and atorvastatin were found to be highly prescribed lipid lowering agents. Losartan potassium, amlodipine and amlodipine+atenolol were the choice of antihypertensive agents. On the other hand, omeprazole and pantoprazole were also prescribed in more quantities among the subjects. Calcium+vitamin D and multivitamins were commonly prescribed drugs for the study subjects.

5. CONCLUSION

In this study, the observations were no different among the three family history groups except in two cases for not detected group (SGPT and triglyceride were higher than the yes and no groups).

Age, obesity, fasting blood glucose (FBG), blood glucose after breakfast (ABF), triglyceride, high density lipoprotein (HDL) and HbA1c were found to be associated in a risk level for thy study subjects.

Concomitant diseases including hypertension and dyslipidemia were also found to be as risk factors for the study subjects.

Dietary modifications, physical activity and oral medicines may maintain adequate glycaemic control but in many times patients may also require insulin. Patients educations and support to enable them to effectively manage their disease, diet and lifestyle may be helpful to reduce the prevalence of diabetes.

6.   REFERENCES

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