



A study on the awareness regarding risk factors of Type 2 diabetes among the patients attending to the out-patient department of BIRDEM in Dhaka, Bangladesh

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Abstract

There are some key risk factors for Type 2 diabetes which can increase the chances of getting this increasingly common type of diabetes. Risk factors for Type 2 diabetes are age, heredity, obesity, sedentary lifestyle, diet, smoking, physical activity and emotional stress. There is much variation in the level of this awareness from population to population and this needs to be explored in different ethnic and social groups for designing appropriate preventive strategies. The present study aimed to assess the awareness and its determinants regarding risk factors of Type 2 diabetes mellitus among Bangladeshi population.

Four hundred respondents (male 44% and female 56%, age 41±10 years, mean ± SD) were selected purposively and the persons who attended for a screening program from the Out-Patient Department of BIRDEM (the tertiary care hospital of Diabetic Association of Bangladesh). Data were collected by a pre-designed, pre-tested, interviewer-administered questionnaire. Knowledge and attitude were measured by mean score. Each correct answer was given one marks and incorrect or don't know was given 0.

Thirty five percent came for blood test due to the symptoms of diabetes. About 32% were diagnosed as diabetic patients in order to fasting plasma glucose level and 37% were diagnosed as diabetic patients according to after 2 hours plasma glucose level. Most of

the respondents (88%) received information about diabetes from health care provider, electronic media, printing media, family member & relative, friends and neighbors. The mean scores of knowledge and attitude were 50.53±21.84 and 84.88±10.87 respectively. The score of awareness were significantly related with receiving information ($t=3.570$, $p<0.0001$ and $t=4.023$, $p<0.0001$). Half of the respondents (51%) had positive family history of diabetes and those with positive family history of diabetes were found to have higher score of awareness (51.63±19.49 and 85.20±11.26). Age, sex, education, monthly income, BMI, fasting blood sugar, acquisition of information and family history of diabetes were tested in a multiple regression model with the Knowledge score as the dependent variable. Age ($\beta=0.095$, $p<0.047$), education ($\beta=0.416$, $p<0.0001$) and BMI ($\beta=0.122$, $p<0.007$) showed significant positive association with the awareness score. Age, sex, education, BMI, monthly income, acquisition of information, knowledge about risk factor of diabetes and family history of diabetes were tested in a multiple regression model with the Attitude score as the dependent variable, Education ($\beta=0.088$, $p<0.104$), knowledge about the risk factor of diabetes ($\beta=-0.443$, $p<0.0001$).

Keywords: Diabetes Mellitus; Type 2 diabetes; Diabetes Risk factors; World Health Organization; Bangladesh



1. Introduction

The global burden of non-communicable diseases is emerging as a major public challenge and these are projected to account for 73% of global mortality by the year 2020. The most common and problematic non-communicable conditions are heart disease, hypertension and diabetes¹. Diabetes is now recognized as a major chronic public health problem throughout the world. The human and economic costs of this epidemic are enormous². In World Health Organization (WHO) report shows that at least 171 million people of the world are suffering from diabetes and it is estimated that by the year of 2030, this number will be double³. So, it is an increasing threat to the world's health service. It affects large number of people of wide range of ethnic and economic levels in both developed and developing countries. WHO Southeast Asia regional prevalence data of diabetes showed that in Bangladesh 3,196,000 people was suffering from diabetes by the year of 2000 and 11,140,000 people will suffer from diabetes by the year of 2030⁴.

Diabetes mellitus describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. The effect of chronic hyperglycemia includes long-term damage, dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels⁵⁻⁹. According to the WHO diabetes mellitus has been classified into two groups: Type 1 and Type 2 (WHO, 1999)⁵⁻⁹. Type 1 Diabetes mellitus is caused by an absolute deficiency of insulin and Type 2 diabetes usually begins with insulin resistance, a condition in which fat, muscle and liver cells do not use insulin properly¹⁰⁻¹¹. Type 2 diabetes is a public health pandemic with devastating impact on morbidity, mortality and cost because this type accounts for >90% of diabetes¹³. In Asia and Africa about 90 to 95 percent people with diabetes have this type of diabetes³. The global

prevalence of Type 2 diabetes is expected to be double in the period of 2000-2025 and may reach a level of almost 300 million people. Among them about 75% will live in developing countries.¹² In association with increasing diabetes prevalence, this will inevitably result in increasing proportion of deaths from Cardiovascular Disease (CVD) and associated consequences of other complication of diabetes².

The risk of developing Type 2 diabetes is determined by some factors that can modify and others that cannot. Risk factors for Type 2 diabetes are older age, race, heredity, obesity, sedentary lifestyle, diet, smoking, low birth weight, physical and emotional stress¹³. Demographic transition combined with urbanization and industrialization has resulted in drastic changes in lifestyles globally but the impact is felt more in developing countries because of their more rapid pace of growth¹⁴. Urbanization leads to unhealthy lifestyle changes which adversely affect metabolic functions. The frequency of diabetes is rising, especially in subcontinent where urbanization is producing rapidly and is producing lifestyle changes¹⁵. A series of epidemiological studies carried out by the Diabetes Research Center in Chennai showed that the prevalence of diabetes had steadily increased among urban Indian adults from 5.25% in 1984 to 13.9% in 2000¹⁶. Similar reports also found from the other countries of subcontinents such as Pakistan¹⁷ Bangladesh¹⁸ and Nepal¹⁹. Lifestyle changes involving major deviation in diet pattern, decreased physical activity, high level of mental stress is causing a large incidence of Type 2 diabetes. Weight gain and decreased energy expenditure contribute further to the existing insulin inactivity¹⁵. People with excess abdominal fat (as opposed to fat accumulation in the thighs and buttocks) have an especially high risk of diabetes. Even if their body weight is normal^{20,21}. The risk of Type 2 diabetes also increases with age beginning at 30 and with a family history of the diabetes²².



There is considerable evidence suggesting that lifestyle interventions targeting modifiable risk factors can either prevent or delay the onset of Type 2 diabetes²³. It was found that Type 2 diabetes was significantly reduced with moderate lifestyle interventions in high risk populations²⁴. Several recent major clinical trials confirmed that type 2 diabetes can be delayed or prevented in people at high risk by multi component lifestyle modification and it could reduce the incidence of diabetes up to 58%²⁵. Evidence demonstrates that change in diet and physical activity can prevent or delay diabetes and its complications^{26, 27, 28}. People in many parts of the world who follow traditional diet high in fiber have a low risk of Type 2 diabetes²⁹. Diets high in fat especially saturated fat worsen glucose tolerance and increase the risk of Type 2 diabetes³⁰⁻³³. It is estimated that >90% cases of Type 2 diabetes could be prevented by prudent diet (high in cereal fiber and poly unsaturated fatty acids and low in trans-fatty acids and glycemic load), avoidance of overweight and obesity (BMI <25 kg/m²), regular moderate or vigorous physical activity for at least 0.5 hr/d and non-smoking³⁴. Regular physical activity decreases the risk of developing Type 2 diabetes among the individuals with family history of diabetes.

Awareness regarding risk factors is a prerequisite for the prevention of diabetes in general population and also in high risk groups. If people become aware about the risk factors that develop diabetes then it can be minimized. It was found that people who perceive themselves to be at risk of a disease are more likely to engage in and comply with efforts to reduce their risk of developing the problem³⁵⁻³⁷. The “Pre-diabetic” state offers the opportunity to intervene to prevent or delay the development of diabetes. Without intervention, approximately one-third of individuals with either IFG (Impaired fasting glucose) or IGF (Impaired glucose tolerance) and two-thirds of individuals with both will develop extant diabetes within 6 years³⁸. After intensive multiyear treatment of adult

‘pre diabetics’ (patient with impaired glucose regulation) with a focus on diet and increased physical activity, large multisided studies in those countries have found that development of overt diabetes decreased by 32 to 58 percent, compared with usual care^{26,27,28}. Recent studies like the Diabetes Prevention Program, the Finnish Diabetes Prevention Program, the Finnish Diabetes Prevention study and the Da Qing study have showed that diabetes is largely preventable^{28,27,39}. Many of these lifestyle risk factors are potentially modifiable and thus provide opportunities for prevention⁴⁰. The evidence suggests that two of these modifiable risk factors, obesity and physical inactivity are the most important contributors to the development of Type 2 diabetes and should be the focus of preventive strategies⁴¹. A study conducted on urban south Indian population in Chennai, India found that many misconceptions were present and more worrisome were the fact that only 12% people were aware that obesity and physical inactivity could predispose to diabetes¹⁴. Randomized control trials in US & Finland showed that reductions in the incidence of diabetes in the order of 58% could be achieved among people with IGT who received an intensive, individualized diet and exercise intervention²⁸ and so, if people become aware about the risk factors that develop diabetes, then it can be minimized.

As diabetes is a silent disease, many sufferers became aware that they have diabetes only when they develop one of its life-threatening complications. Early identification of risk factors and intervention may contribute to the prevention of diabetes. Thus, considerable efforts should put in to inform people about diabetes⁴². Education is the important tool to increase the level of awareness about diabetes risk factor. Proper, adequate and relevant health education regarding diet, weight reduction, physical exercise and quitting of bad habits will help in risk reduction.



The Objectives of the study:

1. To assess awareness regarding risk factors for the development of Type 2 diabetes among the patients attending out-patient department of BIRDEM for the diagnosis of diabetes.
2. To find out the knowledge and attitude regarding risk factors of Type 2 diabetes.
3. To explore the association between knowledge, attitude, socio-demographic variables, family history of diabetes and anthropometric parameters regarding risk factors of diabetes.

2. Literature Review

2.1 Diabetes Mellitus

Diabetes mellitus is a disorder characterized by abnormally high blood glucose levels; People with diabetes cannot properly process glucose and sugar, the body uses for energy. As a result, glucose tends to move inefficiently from the bloodstream to the tissues of the body where it is needed. Therefore, at the same time blood glucose levels are elevated, the rest of the body can be starved for glucose²⁹. Hyperglycemia or high blood sugar is a condition in which an excessive amount of glucose circulates in the blood plasma⁴³ and hypoglycemia is the medical term for a pathologic state produced by a lower than normal level of glucose (sugar) in the blood⁴⁴. Acute complications of diabetes may develop and diabetes mainly arising from severe insulin insufficiency; they are hypoglycemia, diabetic acidosis and coma. The chronic complication is associated with long term damage, dysfunction and failure of various organs, especially diabetic eye disease, kidney disease, diabetic neuropathy, cardio-vascular disease, the diabetic foot⁴⁵.

2.2 Classification of diabetes mellitus

There is several classification systems established for Diabetes Mellitus by the WHO

expert Committee on Diabetes. The current WHO classification system has been established in co-operation with the National Diabetes Data Groups (USA), it is mainly based on an etiology of diabetes mellitus. These are Type 1 diabetes mellitus and Type 2 diabetes mellitus⁴⁶.

Type 1 diabetes indicates the processes of beta-cell destruction that may ultimately lead to diabetes mellitus in which "Insulin is required for survival" to prevent the development of ketoacidosis, coma and death. An individual with a Type 1 process may be metabolically normal before the disease is clinically manifest, but the process of beta-cell destruction can be detected. Type 1 is usually characterized by the presence of Anti-glutamic acid decarboxylase, islet cell or insulin antibodies which identify the autoimmune processes that lead to beta-cell destruction⁴⁶. This type occurs characteristically less than 25 years old⁴⁵. Approximately 5-10 percent of diabetic patients have Type 1 diabetes⁴⁷.

On the other hand, Type 2 diabetes, which accounted for 90-95 percent of those with diabetes, previously referred to as non-insulin depended diabetes encompasses individuals who have insulin resistance and usually have relative insulin deficiency at least initially, and often through out there lifetime, these individuals don't need insulin treatment to derive. There are probably different causes of this form of diabetes. Although the specific etiologies are not known, autoimmune destruction of beta cells doesn't occur, and patients don't have any of the other causes of diabetes lasted above of below⁴⁸. Insulin is the principle hormone that regulates uptake of glucose from the blood into most cells (primarily muscle and fat cells, but not central nervous system cells). Therefore, deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes mellitus³. According to the current definition, to fasting glucose measurements above 126mg/dl (7 mmol/l) are considered diagnostic for diabetes mellitus⁴⁹.



2.3 Prevalence of Type 2 diabetes

The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The urban population in developing countries is projected to double between 2000 and 2030. WHO Southeast Asia regional prevalence data of diabetes showed that in Bangladesh 3,196,000 people was suffering from diabetes by the year of 2000 and 11,140,000 people will suffer from diabetes by the year of 2030⁴.

2.4 Risk Factors for diabetes mellitus

A risk factor is something that increases the chances of getting a disease. Risk factors for Type 2 diabetes are age, race, heredity, obesity, sedentary lifestyle, and diet, and smoking, low birth weight, physical and emotional stress¹⁶.

2.5 Awareness regarding Type 2 diabetes

Awareness comprises a human's perception and cognitive reaction to a condition or event. It is just an ability to be conscious of, feel or perceive. Awareness is a relative concept. It is focused on an internal state, such as a visceral feeling, or on external events by way of sensory perception. There is now irrefutable evidence that diabetes education, awareness and motivation for self care, improves diabetes care, reduces diabetic complications and thus reduces economic burden of diabetes⁶¹. In India only 22.2% of whole population and 41.0% of known diabetic patients were aware that diabetes could be preventable¹⁴.

Knowledge is the psychological result of perception and learning and reasoning⁵⁹. The Knowledge about prevention of diabetes increased with the level of education¹⁴. According to Diabetic Association of

Pakistan among the Pakistani population estimated that the overall knowledge regarding diabetes was not good. Around 54% had poor knowledge about diabetes. Thirty-four percent had fair knowledge diabetes while only 13% had good knowledge. Education and counseling about all the aspects of diabetes are needed. Group education as well as individualized education programmers should be planned which can lead to better and management techniques in diabetes⁵².

Attitude is a manner of acting, feeling, or thinking that shows one's disposition, opinion and mental set etc⁶⁰. Control of obesity and ideal body weight is important for better glycemic control and prevention of complication, but the characteristics of our patients were not according to this norm as more than half of the patients were overweight or obese. Majority of the patients had a wrong of their own weights and most overweight patients did not consider themselves to be overweight, thus a problem with their attitudes⁵². So the study did by the Pakistan Diabetic Association highlights the need to educate the patients about their body weight as well as assessment of obesity⁵².

Fortunately, Type 2 diabetes is a slowly progressive disease with a long pre-diabetic stage in its natural history indeed, the pre-diabetic stage offers a golden window of opportunity to prevent or delay the onset of diabetes in high-risk individuals (primary prevention of diabetes). Data in Chennai showed that the awareness of diabetes is very low⁵³. Of the 2600 participants, 25% of the individuals had never heard of the condition, and less than 25% knew that diabetes is preventable⁵³.

Many people are unaware of the health dangers of high cholesterol, hypertension, low birth weight, mental stress, physical inactivity, smoking etc. Proper, adequate and relevant health education regarding diet, weight reduction, and physical exercise and

also quitting of bad habits will help in risk reduction⁶¹.

3. Methodology

3.1 Study Design

A descriptive cross-sectional study applied for this study in the BIRDEM among the respondents who attended to the out-patient department for the treatment of diabetes age > 18 years and the persons who had no previous record of intolerance.

3.2 Sample Size and Methods

A total of 400 respondents were selected using purposive sampling method from BIRDEM (a tertiary healthcare hospital) of out-patient department. Respondents who were attended for diagnosis of diabetes and

without having any previous intolerance record were selected.

3.3 Data Collection Tools and Techniques

A pre-designed, pre-tested, interviewer administered questionnaire was constructed for data collection. Especially Data were collected on age, the educational and occupational status, Anthropometric parameters, and Clinical and biochemical parameters of the respondents etc.

3.4 Data Analysis

Data editing was carried out by checking and verifying the computed questionnaire at the end of the interview and also at the end of the whole survey and before analysis. Then the data analysis was done by using the Statistical Package for Social Science (SPSS) computer program version 16.

4. Findings and Result

Table 1: Characteristics of the study subject (N=400)

Variables	
Age(Year)	41.86 ± 10.03
Sex	
Male	176(44%)
Female	224(56%)
Religion	
Muslim	397(95%)
Hindu	19(4%)
Christian	1(0.5%)
Others	1(0.5%)
Education	
Illiterate	84(21%)
Primary to class 8	71(18%)
SSC-HSC	168(42%)
Graduate and above	77(19%)
Occupation	
Service	101(25.3%)
Business	69(17.3%)
Housewife	201(50.3%)
Unemployed	23(6.3%)
Day laborer	4(1%)
Monthly Income	10,000(2000-25,000)

Results are expressed as mean ± Standard deviation, median (range) and number (%)

Table 1 represents the characteristics of the study sample, a total of 400 respondents were selected for studied and the mean age of the study respondents was 41.86 ± 10.03 . Among the study respondents, male was 176(44%) and female was 224 (56%). Muslim was 379(95%), Hindu was 19(4.0%), Christian was 1(0.5%) and others was 1(0.5%). The study respondents were divided into four groups according to their education.

Among them illiterate was 84(21%), primary was 71(18%), secondary and higher secondary was 168(42%) and graduate and above was 77(19%).

As respondents' occupation there were service holder 101(25.3%), businessman 69(17.3%), unemployment 23(6.3%), 201(50.3%) housewife and day labor was 4(1.0%). Monthly income of the study respondents was 10,000 (2000-25000).

Table 2 Anthropometric parameters of the study subjects (N=400)

Variables	Male(N=176)	Female(N=224)	Total(N=400)
Wt (kg)	65 ± 9.8	59 ± 10.6	62 ± 10.6
BMI	24.03 ± 3.25	24.69 ± 3.18	24.40 ± 3.82
Waist (cm)	87 ± 9.6	87 ± 12	87 ± 11
Hip (cm)	94 ± 7.5	97 ± 9.5	95 ± 8.8
W:H ratio	0.92 ± 0.58	0.89 ± 0.08	0.90 ± 0.07

Results are expressed as mean \pm SD. BMI=Body Mass Index, W: H ratio=Waist hip ratio

Table 2 shows Anthropometric parameters of the study respondents where Weight (mean \pm SD) value of the study respondents was 62 ± 10.6 . Waist (mean \pm SD) and hip (mean \pm SD) of the respondents were 87 ± 11 and 95 ± 8.8 respectively. The value

of waist hip ratio (mean \pm SD) of the study respondents was 0.90 ± 0.07 , in male was 0.92 ± 0.58 and 0.89 ± 0.08 was in female. The (mean \pm SD) value of BMI was (24.03 ± 3.25) and (24.69 ± 4.18) in male and female respectively.

Table 3 Distribution of the study subjects according to BMI (N=400)

BMI	Male (N=176)	Female (N=224)	Total (N=400)
Underweight (<18.5)	5(3%)	8(4%)	13(3.3%)
Normal weight (18.5-24.9)	112(64%)	120(54%)	232(58.0%)
Over weight (25.0-29.9)	50(31%)	72(32%)	122(30.5%)
Obesity class I (30.0-34.9)	8(4%)	19(9%)	27(6.8%)
Obesity class II (35.0-39.9)	1(0.6%)	5(2%)	6(1.5%)
Obesity III (>40.0)	0(0%)	0(0%)	0(0%)

Results are expressed as number (%)

In Table 3, among the study respondents 13(3.3%) was underweight, 232(58.0%) was normal weight, 122(30.5%) was

overweight, 27(6.8%) was class I obese and 6(1.5%) was class II obese.

Table 4 Clinical and biochemical parameters of the study subjects (N=400)

Variables	
FPG (mmol/l)	7.0 ± 3.4
2-h plasma glucose (mmol/l)	11 ± 5.81
SBP (mmHg)	118 ± 11.65
DBP (mmHg)	78 ± 9.2

Results are expressed as mean ± SD, FPG=Fasting plasma glucose, SBP=Systolic Blood Pressure, DBP=Diastolic Blood Pressure

Table 4 shows Clinical and biochemical parameters of the study respondents where fasting plasma glucose and after 2 hours glucose (mmol/l, mean ± SD) value of the study respondents was 7.0±3.4 and 11.0±5.81 respectively.

Mean systolic and diastolic blood pressure (mm/Hg, mean ± SD) was 118.30±11.65 and 78.0±9.2 respectively.

Table 5 Knowledge and attitude score about the risk factors of diabetes of the study subjects (N=400)

Variables	
Knowledge Score (%)	50.53 ± 21.84
Attitude Score (%)	84.88 ± 10.87

Results are expressed as mean ± SD

In Table 5, Knowledge (mean ± SD) score and attitude (mean ± SD) score of the study respondents were 50.53±21.84 and 84.88±10.87 respectively where Knowledge

and Attitude were measured by mean score and each correct answer was given one marks and incorrect or don't know was given 0.

Table 6 Knowledge regarding risk factors of diabetes among the study subjects (N=400)

Risk Factors	Correct answer	Incorrect answer	Don't know
Family history	220(55%)	95(24%)	85(21%)
Increasing age	275(69%)	45(11%)	80(20%)
Smoking	111(28%)	27(7%)	262(65%)
Overweight	286(71%)	29(7%)	78(18%)
Lack of regular exercise	293(73%)	17(4%)	90(23%)
Gestational diabetes	102(26%)	13(3%)	285(71%)
Low birth weight	53(13%)	13(3%)	334(84%)
Mental stress	300(75%)	23(6%)	76(19%)
IGT	10(3%)	0(0%)	390(97%)
Sedentary lifestyle	322(81%)	12(3%)	66(16%)
High cholesterol level	122(31%)	10(2%)	268(67%)
Hypertension	153(38%)	29(7%)	218(55%)
Oily foods	274(69%)	26(6%)	100(25%)
Fast foods	242(60%)	19(5%)	139(39%)
Soft drinks	258(65%)	17(4%)	125(31%)

Results are expressed as number (%)



Table 6 represents the Knowledge regarding risk factors of diabetes among the study respondents that the study respondents 220(55%) believed that family history is the risk factor, most of the 71% and 81% of the study respondents believed overweight and sedentary lifestyle is a risk factor, 300 (75%) believed mental stress is a risk factor, 293 (73%) of the study respondents believed lack of exercise is a

risk factor of diabetes. Among the study respondents most of all 97% don't know about IGT, 334 (84%) don't know about low birth weight and 285 (71%) don't know gestational diabetes as a risk factor of diabetes. 69%, 60% and 65% of the respondents believed that Oily foods, fast foods and soft drinks as a risk factor of diabetes.

Table 7 Misconception regarding risk factors of diabetes among the study subjects (N=400)

Misconception	Frequency
1.Oily foods	
Oil is good for health	5(19%)
Oily foods have no sugar	2(8%)
Oily food is harmful for gastric but not for diabetes	1(4%)
Don't know	9(35%)
2.Fast food	
Fast foods have best quality of carbohydrates	1(5%)
Good for health	3(16%)
Don't know	6(32%)
3.Soft drinks	
Do not contained sugar	4(24%)
Help to digest	2(12%)
Good for health	3(18%)

Results are expressed as number (%)

Table 7 shows the Misconception regarding risk factors of diabetes among the respondents that nineteen percent of the study population believes that oil is good for health and 8% of them said that it does not contain sweet, which counted as misconception. 4% of the study respondents thought that oily foods are

harmful for gastric but not for diabetes. 5% of the study population believes that fast foods contained best quality of carbohydrates 16% thought it is good for health. Among the study respondents 24% thought soft drinks do not contain sugar and 12% believes that it helps to digest food and 18% believe it is good for health.

Table 8 Knowledge and attitude of the study subjects according to different variables

Variables	Knowledge	Attitude
Sex		
Male (N=176)	52.32 ± 19.36	87.39 ± 10.65
Female (N=224)	42.89 ± 20.42	82.98 ± 10.69
t/p—value	4.716/0.0001	4.023/0.0001
Family history		
Have family history	51.63 ± 19.49	85.20 ± 11.26
No family history	44.15 ± 19.61	85.49 ± 10.17
t/p—value	3.690/0.0001	-0.258/0.797
Acquisition of information		
Received	48.30 ± 20.35	85.54 ± 11.06
Not receives	37.59 ± 19.18	79.98 ± 7.94
t/p—value	3.570/0.0001	4.279/0.0001

Results are expressed as mean ± SD

Table 8 explains the Knowledge and attitude of the study subjects according to different variables where the knowledge scores (%) and attitude scores (%) of male and female differ significantly (52.32±19.36 vs 42.89±20.42, P< 0.0001) and (87.39±10.65 vs 82.98±10.69, P< 0.0001). The knowledge scores (%) between the group with family history and without family history of diabetes differed

significantly (51.63±19.49 vs 44.15±19.61, P< 0.0001). The knowledge scores (%) and the attitude scores (%) between two groups of received information and not received information of diabetes show statistically significant (48.30±20.35 vs 37.59± 19.18, P<0.001) and (85.54±11.06 vs 79.98±7.94, P<0.0001).

Table 9 Knowledge & attitude score of the study subjects according to education

Education	Knowledge score (percentage)	Attitude score (percentage)
illiterate	33.82 ± 19.67	78.39 ± 9.6
Primary	39.20 ± 17.83	82.84 ± 10.67 ^{a,b}
SSC-HSC	51.24 ± 18.36 ^{a,b}	86.86 ± 9.87 ^{a,b}
Graduate and above	59.52 ± 17.29 ^{a,b}	89.56 ± 10.97 ^{a,b}
F/P-value	33.60/0.0001	19.86/0.0001

Results are expressed as mean ± SD. One way ANOVA (Post Hoc Bonferroni) was performed as the test of significance, P<0.05 was taken as level of significance, a=illiterate group; b=primary group.

In Table 9, the knowledge scores (%) and illiterate and primary to SSC-HSC. Graduate and above significantly differed (33.82±19.67, 39.20±17.83 vs 51.24±18.36 vs 59.52± 17.29, P< 0.0001).

In case of the attitude scores (%) of illiterate to primary, SSC-HSC, graduate and above significantly differed (78.39±9.6 vs 82.84±10.67 vs 86.86±9.87 vs 89.56±10.97, P< 0.0001).

Table 10 Multiple regression analysis of percentage of knowledge score as a dependent variable with other parameters of the study subjects

Variables	β	P
Age	0.095	0.047
Sex	-0.067	0.191
Education	0.416	0.0001
Monthly income	0.025	0.585
BMI	0.122	0.007
Fasting blood glucose	-0.077	0.133
Acquisition of information	-0.067	1.142
Family history of diabetes	-0.005	0.911

β for standardized regression coefficient; total knowledge score was taken as dependent variable whereas others were taken as independent variable

Table 10 shows that the multiple regression analysis of percentage of knowledge score as a dependent variable with other parameters of the study

respondents where education $p < 0.0001$ was highly significant and BMI $p < 0.007$ also significant.

Table 11 Multiple regression analysis of percentage of attitude score as a dependent variable with other parameters of the study subjects

Variables	β	P
Age	-0.031	0.509
Sex	-0.056	0.255
Education	0.088	0.104
Monthly income	0.031	0.483
BMI (Body Mass Index)	0.047	0.299
Fasting blood glucose	-0.061	0.069
Acquisition of information	-0.443	0.0001
Family history of diabetes	-0.102	0.017

β for standardized regression coefficient; total knowledge score was taken as dependent variable whereas others were taken as independent variable

Table 11 represents that the Multiple regression analysis of percentage of attitude score as a dependent variable with other parameters of the study respondents

where attitude scores (%) significantly associated with acquisition of information ($\beta = -0.443$, $P < 0.0001$) and family history of diabetes ($\beta = -0.102$, $P < 0.017$).

5. Discussion

Increasing prevalence of diabetes and its complications in Bangladesh would pose a real threat in respect to existing health services. Besides significant mortality, diabetes related morbidities such as diabetic retinopathy, neuropathy and cardiovascular

disease have also placed a heavy financial burden on society. Prevention is important because diabetes is costly both in human and monetary matters. Awareness regarding the risk factors of diabetes can assist in early prevention of the disease and reduce the



incidence of it. Awareness depends on socioeconomic conditions and cultural beliefs and habits of human. Understanding of these variables is highly important in designing prevention of diabetes. The present study was designed to investigate awareness regarding Type 2 diabetes among Bangladeshi population.

In the present study, about 31% and 4% male and 32% and 9% female are overweight and class I obese respectively.

A high BMI is one of the most potent risk factors for the development of diabetes. In a study among the Seychelles population in Africa region showed that diabetes mellitus was strongly associated with excess body weight. (e.g. OR in both men and women: 2.6 for BMI more vs. less than 25 kg/m²)⁵⁴. So, individuals should be targeted for intensive lifestyle prevention if they have BMI more than 25 kg/m².

More than 30% respondents are diabetic using the cut-off value of fasting plasma glucose level (>7.0 mmol/l) and after 2 hours plasma glucose level (>11.1 mmol/l) respectively. IFG and IGT are found among 15% of the subjects using the cut-off value of fasting plasma glucose level (6.1-<7.0 mmol/l and after 2 hours plasma glucose level (7.8-<11.1 mmol/l). A study conducted in rural population of Bangladesh found that crude prevalence of Type 2 diabetes and IFG was 4.3% and 12.4% respectively⁵⁸. This 'pre-diabetic' state offers the opportunity to prevent or delay the development of diabetes. Without intervention, approximately one-third of individuals with either IFG or IGT and two-thirds of individuals with both will develop extant diabetes within 6 years⁴⁰. If individuals with IGT become aware to make lifestyle changes like losing weight, reducing fat intake and increasing physical activity can result in a 58% reduction in the incidence of diabetes⁵⁰.

In the study, most of the respondents (88%) answered that they have received information about diabetes from different sources. It was

found that most of the information is obtained through friends and neighbors or family and relatives. The print and mass media are important sources of information. Another important finding is that only small proportion of respondents obtained their information from the health professionals. A cross-sectional survey conducted to evaluate the general public's knowledge about diabetes among Singapore population found that most of the information obtained through friends and relatives or books and magazines. Similarly they found a very few information were found from health professionals⁵⁵. But in another study conducted among patients attending Klinik Kesihatan Seri Manjung found that the major sources of knowledge were medical staff (45.5%) and radio and newspaper.

In this study respondents came to check their blood glucose level after noticed different symptom of diabetes, to know by their interest and advised by doctor. It is noted that only a very few respondents came for routine checkup. It had showed the lack of awareness. The American Diabetes Association suggested that screening for diabetes, as routine medical care might be appropriate for individuals with one or more risk factors of diabetes.

The respondents' knowledge score about the risk factors of diabetes is an average score (50%) which indicating that more effort should be put into educates the public about risk factors. However, the attitude score about risk factors is high (85%). In the Singapore study, it was found that the respondents recorded the lowest knowledge score regarding the risk factors of diabetes⁵⁵. In another study in Chennai, the knowledge score of the subjects was found 47.5%¹⁴.

The respondents are tested regarding various risk factors of diabetes- family history, age, smoking, overweight, lack of exercise, gestational diabetes, low birth weight, stress, IGT, sedentary life style, high cholesterol level, hypertension, oily foods, fast food and soft drinks. Majority of them are agreed about



overweight, lack of exercise, sedentary lifestyle as the risk factors of diabetes. And more than half of them think that family history; oily food, fast food and soft drinks are the risk factors of diabetes. In a study on rural population of Bangladesh showed that positive family history, less physical activities, high BMI showed to fold risk of diabetes⁵⁸. In Chennai study, it was found that knowledge of the role of obesity and physical inactivity in producing diabetes was very low, with only 12% of the study respondents reporting these as risk factors for diabetes¹⁴. A study done on siblings found that female sex, age and having a patient with diabetes were the most strongly associated with perception of increased risk⁵⁶. On the other hand, many respondents are not aware about other major risk factors like Gestational Diabetes Mellitus (GDM), IGT, hypercholesterolemia, hypertension and smoking. GDM and IGT are two important contributors in the development of diabetes. International literature has portrayed that people with IGT are at increased risk for Type 2 diabetes and 50% actually develop the disease⁵⁷. In one study, it was found that women with previous GDM are more likely to have modifiable risk factors for developing diabetes than women without diabetes⁵¹.

Diets high in fat worsen glucose tolerance and increase the risk of Type 2 diabetes. The questions related to risk factors for diabetes reveal that many misconceptions are present regarding oily foods, fast food and soft drinks among the study respondents. Around 30% respondents do not aware the harmfulness of these foods.

Knowledge score is significantly associated with attitude score ($r=0.477$, $p<0.0001$). A study held at Klinik Kesihatan Seri Manjung also found a significant positive correlation between knowledge and attitude¹²¹. Age, sex, education, monthly income, BMI, fasting blood glucose, acquisition of information family history of diabetes and knowledge score are tested in a multiple regression model. Age ($\beta= 0.095$, $p<0.047$), education (β

$= 0.416$, $p<0.0001$) and BMI ($\beta = 0.122$, $p<0.007$) are shown a significant positive association with knowledge score. However, knowledge score ($\beta = -0.443$, $p<0.0001$) and having family history ($\beta = -0.102$, $p<0.017$) of diabetes are shown a significant positive association with attitude score. A study conducted on siblings showed that having a patient with diabetes strongly and independently predicts awareness of being likely to develop diabetes⁵⁶. Another study suggests that having a family history of diabetes risk factors because of more daily consumption of fruits and vegetables⁵⁰.

Several studies have shown that Type 2 diabetes can be prevented with lifestyle modification. The results of the Diabetes Prevention Program, extending previous data from China and Finland confirmed that the incidence of Type 2 diabetes was significantly reduced with moderate lifestyle interventions in high-risk populations²⁴.

So, by educating or creating awareness about the risk factors, it is hoped that general people and high-risk individuals would be motivated to adopt a healthy lifestyle, undergo routine medical check-ups and be an active player in the prevention of diabetes.

6. Conclusion

The knowledge regarding risk factors of Type 2 diabetes was found average but there were areas of deficiencies in IGT, GDM, low birth weight and high cholesterol level as risk factors of Type 2 diabetes. On the other hand, it is very clear that the study respondents had good attitude score regarding risk factors of Type 2 diabetes. Age, sex, education, family history, acquisition of information and BMI have shown a significant association with knowledge and sex, education, acquisition of information and knowledge about risk factors are significantly associated with attitude.

Limitations

- The interviews were administered by four interviewers. There may have



been subjective variation in recording data.

- The study covered only the Out Patient Department of BIRDEM which doesn't represent the whole population of Bangladesh.
- Time constraint was a limitation of this study. More data could be collected and an in-depth analysis could be made if more time was available for this study.

Recommendations

1. The government should provide education and counseling about all the aspects of diabetes are needed.

2. Findings from the current study have implications for improving child and adolescent nutrition, particularly in upper class in the capital city of Bangladesh.

3. Proper Education and creating awareness about the risk factors, it is hoped that general people and high-risk individuals would be motivated to adopt a healthy lifestyle, undergo routine medical check-ups and be an active person to prevent diabetes.

Further Study Scope

Although the present study was done in a very small scale due to some limitations such as resources, time; but the study findings will certainly support as a base line study for further and extended research in this regard at future.

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