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RESEARCH ARTICLE

COMPLICATIONS OF TYPE-2 DIABETES AMONG PATIENTS OF PABNA DISTRICT IN BANGLADESH: A SURVEY BASED STUDY

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ABSTRACT

This study comprehensively conducted with the diabetic patients associated with other diseases (heart diseases, kidney diseases, eye disease). In this project we are trying to find out the crosslinked relation of other diseases associated with diabetes. The incidence of diabetes mellitus (DM) continues to raise and has promptly turned into one of the most prevalent and costly chronic diseases worldwide. A close link exists between DM and cardiovascular disease (CVD). DM and Kidney disease (DKD) and DM and retinopathy (DR) which are the most prevalent cause of morbidity and mortality in diabetic patients. Cardiovascular (CV) risk factors such as obesity, hypertension and dyslipidemia are common in patients with DM, placing them at increased risk for cardiac events. However, Diabetic Kidney disease is the major/most often cause of kidney failure. People have a greater risk of developing end stage renal disease type-2 diabetes. In addition, Diabetic retinopathy (DR) causes massive visual loss on a global scale. Recent work reveals that diabetes have gross effects on the retinal neurovascular unit and its interdependent vascular, neuronal, glial, and immune cells. The research design was cross-sectional, and the research was conducted in Pabna district, Bangladesh. The sample size was calculated as 350. A pre-tested questionnaire was used to collect data after obtaining ethical approval. Data was collected by means of interview of patients. Among 350 of the total participants, 115 (32.8%) were of male and 235 (67.1%) of female. The mean body weight of respondents was 62.65 ± 11.07 kg and mean age of the patients belongs to 51.56 ± 10.29 year. We found 66 (18.86%) only diabetes patients, 49 (14%) Diabetes with heart disease patients, 105 (30%) diabetes with eye disease patients, 42 (12%) Diabetic with nephropathy patients and 35 (10%) patients had both heart and eye diseases with diabetes, 14 (4%) patient had heart and Kidney diseases along with diabetic. The mean duration of diabetes in the present study was 8.81 years. All patients were type-2 diabetic patients. In the incipency of the project we emphasize on knowledge about diabetes, diabetes facts, causes of diabetes and especially on diabetes controlling measurements. The key purpose of the study is to improve the lifestyle and to improve the overall health condition of diabetic patients.

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INTRODUCTION

Diabetes mellitus, or simply diabetes, is a group of diseases can be recognized by high blood glucose levels that is the consequence of defects in the body's ability to produce and/or use insulin. (American Diabetic Association., 2009). It is a condition usually defined by the level of hyperglycemia giving rise to risk of microvascular damage (retinopathy, nephropathy and neuropathy) (Sally et al., 2006). It is consequential with shortening of life expectancy, increasing morbidity due to certain diabetes related microvascular complications, elevated

risk of macrovascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life. The risk factors liable for type II diabetes are obesity, diet and physical inactivity, increasing age, insulin resistance, family history of diabetes, genetic factors, and race and ethnicity. As a risk of genetic factors, research has demonstrated that certain gene variations elevate the risk of causing diabetes. Diabetes is a group of chronic diseases ascertained by hyperglycaemia. About 20% to 30% of the patients with diabetes developed diabetes onset nephropathy. Corresponding with other microvascular complications of

diabetes, there have a connection between glucose control and the risk of causing diabetic nephropathy. Patients should control the exalted glucose level to prevent or control diabetic nephropathy (Gross *et al.*, 2005). More than 80% of amputations occur after foot ulceration or injury, which can result from diabetic neuropathy (Boulton *et al.*, 2005). Cardiovascular disease is a most occurring complication and the major cause of premature death among diabetic patients (Merz *et al.*, 2002). Diabetic patients are at 2 to 6 folds of higher risk for leading complications such as ischemic heart disease, cerebrovascular disease and peripheral vascular disease than the general population. Among the macrovascular diabetes complications, coronary heart disease has been linked with diabetes in manifold studies started with the Framingham study (Kannel *et al.*, 1979). The leading cardiovascular risk factors in the non-diabetic population (smoking, hypertension and hyperlipidemia) also have function in diabetes, but the risks are elevated in the pre-existing diabetes. Thus the life expectancy in diabetic patients is 7 to 10 years lesser than non-diabetic people. About 25% of patients going a diabetes clinic who have raised lipid levels (Jacobson *et al.*, 1985). Mortality from stroke is provoked nearly about 3-fold when patients with diabetes are compared to those have no diabetes. (Kernan WN *et al.*, 2002). Diabetic eye disease is a group of eye problems that can affect people with diabetes. These conditions include glaucoma, cataracts, diabetic retinopathy and diabetic macular edema (N. Cho *et al.*, 2015) Over time, diabetes can cause damage eyes that can lead to poor vision or even blindness. Various outlooks of immunity are varied in patients with diabetes. Fungal cystitis, rhino-cerebral mucormycosis and community-acquired pneumonia are the most occurring infections the diabetic patients suffer from (Gu *et al.*, 1998).

METHODS AND MATERIALS

Selection of the Study area: Study area of a research work is selected before conducting field investigation. Pabna has been selected as this area faces enormous problems of many diseases like diabetics specially with kidney, heart and eye diseases. Ideally it would have been better to consider the whole area of Pabna area to evaluate the factors related to these diseases.

Preparation of Questionnaire: It is a research tool consisted of a series of questions prepared in order to gather information. At first draft questionnaire is prepared and after correction the final questionnaire is prepared for the study.

Data Collection: The close ended questions relevant to the research were asked to the people of the study area and data were collected from Pabna Diabetic Hospital.

Data Analysis Phase: After finishing the data collection step the collected data was analyzed. Descriptive statistics were applied.

Data Assembling and Processing: The collected data was assembled and processed manually in this part using Microsoft Excel. Necessary calculation was done.

FINDINGS

The usual aim of the study was to presume the outbreak and associated risk factors for diabetic patients and diabetes onset kidney, heart and eye diseases among patients in Pabna,

Bangladesh. A total of 350 patients were evaluated of which all were from Pabna District. Among the total participants, 115 (32.8%) were of male and 235 (67.1%) of female. It was observed that mean age of the patients belongs to 51.56 ± 10.29 year. About 68% of the patients were having positive family history for type 2 DM. Co-morbidities were found in more than 60% of the patients. Hypertension was the commonest followed by hypercholesterolemia. In fact, obesity is believed to account for 80-85% of the risk of developing type 2 diabetes, while our research suggests that 74% of participants were obese people and likely to develop type 2 diabetes. (Table-1) Stress and life style aggravates diabetes. Stress and sedentary life style raise blood sugar levels, activates fat cells, impairs glucose tolerance, increases insulin resistance and impacts blood pressure. Table-1 shows that 70% and 58% of participants lead sedentary life style and experienced stress in their life respectively. People with Type 2 diabetes can reverse their condition with diet and exercise. Out of the patients who performed regular physical exercise, 64% (n=224) used to exercise for more than 30 minutes daily. The mean duration of diabetes in the present study was 8.81 years and mean body weight of respondent was 62.65 ± 11.07 kg.

Table 1. Percentage of diabetes subjects and life style characteristics of the participants

Variables	Value
No of patient	350
Mean Age	51.56 ± 10.29 year
Mean Weight	62.65 ± 11.07 kg
Duration of diabetes onset	8.81 year
Type of diabetes	Type 2
Family history of diabetes	68%
Obesity	74%
Physical exercise	64%
Life style	70% patient lead sedentary life-style
Stress in Life	58%

We found 66 (18.86%) only diabetes patients whereas 49 (14%) Diabetes with heart disease patients, 105(30%) diabetes with eye disease patients, 42 (12%) diabetes with nephropathy patients and 35 (10%) diabetes with heart and eye diseases patients, 14 (4%) diabetes with heart and Kidney diseases respondents, 21 (6%) diabetes with kidney and eye diseases patients and 18 (5.14%) of participants are diabetes with heart kidney and eye diseases patients. Only 18.86% of participants had diabetics and 81.14% of participants had diabetes with others associated diseases (Table 2).

Table 2. Percentage of participants with Diabetes mellitus linked diseases

Variables	Value (percentage)
Only Diabetes Patients	18.86
Diabetes with heart disease patients	14
Diabetes with eye diseases patients	30
Diabetes with kidney disease patients	12
Diabetes with heart and eye diseases	10
Diabetes with heart and Kidney patient	4
Diabetes with kidney and eye diseases	6
Diabetes with heart, kidney and eye diseases	5.14

Among the patients having diabetics with kidney diseases 34% had blood in urine, 30% had urinary tract infection, 11% had back pain and 25% had edema (Table 3). Among the patients having diabetes with eye diseases, 18% patient had cataract, 20% patient had glaucoma, 21% patient had retinopathy, 27% patient had edema on eyes and 14% patient had watery eyes (Table 4).

Table 3. Percentages of complications of Diabetic patients with kidney diseases

Variables	Value
Blood in urine	34%
Urinary tract infection	30%
Backpain	11%
Edema	25%

Table 4. Percentages of complications of Diabetic patients with eye diseases

Complications	Percentages
Cataract	18
Glaucoma	20
Retinopathy	21
Edema	27
Watery eye	14

Among the patients having diabetes with heart diseases, 8% patient had palpitation and sweating, 8% had heart enlargement and 18% had heart block (Table-5).

Table 5. Percentages of complications of Diabetic patients with heart diseases

Variables	Value
Palpitation and sweating	8%
Heart enlargement	8%
Heart Block	18%

DISCUSSION

Most of the organs in the body are affected by Diabetes mellitus. The manifestations of these effects are normally detected by the alteration of function that may or may not be peculiar to diabetes. The cruelty of diabetic retinopathy is mostly demonstrated thus it is related to blindness which lessen the quality of life. In our survey we had found that 30% patients was suffering different types of eye diseases and most of them experiences eye problems after getting diabetic. So, we can say diabetes can affect eye very badly. Almost 2% of the total population with diabetes is blind, the rate of blindness is ten times higher than in the general population (Donald *et al.*, 2003). Diabetic retinopathy is seldom developed within five years since the commencement of the disease or before puberty (Kanski *et al.*, 2004, Donald *et al.*, 2003). Around 5% of type 2 diabetics had pre existing diabetic retinopathy on first examination (Kanski *et al.*, 2004, Donald *et al.*, 2003, Ossamma *et al.*, 1998). After 20 years of the diseases most of the patients with type 1 and more than 60% of those with type 2 diabetes mellitus invaded by certain degree of diabetic retinopathy (Kanski *et al.*, 2004, Donald *et al.*, 2003).

Enormous epidemiological data demonstrate the ligature between hyperglycemia and increased cardiovascular risk (Elley CR *et al.*, 2008, Gerstein HC *et al.*, 2005, Khaw *et al.*, 2004, Stratton IM *et al.*, 2000, Turner RC *et al.*, 1998, Eeg-Olofsson *et al.*, 2010) There has strong evidence demonstrated greater risk for atherosclerotic cardiovascular diseases with raising dysglycemia (Sarwar *et al.*, 2010, Seshasai *et al.*, 2011, Selvin *et al.*, 2005, Coutinho *et al.*, 1999, Mazzone *et al.*, 2010, Selvin *et al.*, 2004, Kuusisto *et al.*, 1994, Rodriguez *et al.*, 1999), with an inferential 11% to 16% raise in cardiovascular events for every 1% increase in HbA (Stratton *et al.*, 2000, Holman RR *et al.*, 2008).

Multiple factors, like age, peripheral artery disease and ischemic heart disease, as well as diabetes mellitus—certain risk factors, such as poor glycemic control (higher HbA_{1c}) and insulin resistance, have been manifested heart failure in patients with diabetes mellitus (Coutinho *et al.*, 1999, Carr AA *et al.*, 2005, Bertoni *et al.*, 2004, Nichols *et al.*, 2001, Erqou S *et al.*, 2013, Barzilay *et al.*, 2004, Iribarren *et al.*, 2001). Our data showed about 14% patients was suffering heart disease at the same time with diabetics. Diabetes mellitus accelerates atherosclerosis and may be diffuse and severe. Hence, ischemic cardiomyopathy is a leading cause of heart failure in the diabetes mellitus patients. Even in the absence of epicardial coronary artery disease, micro vascular disease, characterized by arterial thickening and fibrosis, as well as endothelial and vasomotor dysfunction, can raise the risk of heart failure in diabetes mellitus. Hypertension is another often co-existing condition in diabetes mellitus, resulting left ventricular hypertrophy and resounding to the occurrence of heart failure (Adler *et al.*, 2000). The relevancy between diabetes mellitus and heart failure seems bidirectional. There has increased risk of heart failure in diabetes mellitus, and heart failure is a risk factor for diabetes mellitus (Guglin *et al.*, 2014, Guglin *et al.*, 2014).

Diabetic nephropathy is kidney disease associated with long-standing hyperglycemia, first described in 1936 by C. Wilson and P. Kimmelstiel as interpapillary glomerulonephritis (Tervaert *et al.*, 2010). The main features of diabetic nephropathy include the nephrotic syndrome with excessive filtration of protein into the urine (proteinuria), high blood pressure (hypertension), and progressive impairment of kidney function. In severe cases DN leads to kidney failure, end-stage renal disease (ESRD) with the need for chronic dialysis or kidney transplantation.

Our data revealed about 12% patients were suffering kidney disease at the same time with diabetics. Proteinuria occurs in type 2 diabetic patients is more variable, ranging from 5 to 20% (Valmadrid *et al.*, 2000, Adler *et al.*, 2003). Diabetes causes typical histopathological changes in kidney structure, first described by Kimmelstiel and Wilson (Tervaert *et al.*, 2010), Diabetes dramatically increases the risk of various cardiovascular problems, eye problems and kidney problems. Age, duration of diabetes and poor glycemic control are developed risk factors (Zimmet *et al.*, 2001, Hu *et al.*, 2001, Walley *et al.*, 2006) which we exposed as risk factors for diabetic patients and diabetes onset other diseases.

Conclusions

The complications of diabetes mostly lead to the death of most diabetic patients, as the risk for stroke and heart disease is much superior when compared to adults without diabetes. Diabetes can also lead to kidney disease, blindness, infections, nervous system damage, dental disease, and complications of pregnancy. It can also be a reason for amputations. There is also higher chance for diabetic patients to have depression. People living with type 2 DM are more vulnerable to various forms of both short-term and long-term complications, which often lead to their premature death. This tendency of increased morbidity and mortality is seen in patients with type 2 DM because of the commonness of this type of DM, its insidious onset and late recognition, especially in resource-poor developing countries like Bangladesh.

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