

CIRRHOSIS OF LIVER AND DIABETES MELLITUS

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Abstract

Diabetes mellitus is being recognized as a serious global health problem and frequently associated with cirrhosis of liver. The cross-sectional comparative study was conducted among 83 diabetic cirrhotic patients admitted in Gastrointestinal Hepatobiliary and Pancreatic Disorders Department of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic disorders and 83 non-diabetic cirrhotic patients admitted in Gastroenterology and Hepatology Department of Bangabandhu Sheikh Mujibar Medical University, Dhaka to assess the relationship between cirrhosis of liver and diabetes mellitus. The study was carried out during the period of January to June, 2010 and data were collected through face to face interview and reviewing medical documents by using a semi-structured questionnaire and checklist. Male, Muslims and illiterate were predominant in both diabetic and non-diabetic cirrhotic patients. It was found that non-viral cirrhosis was much higher in older age group (51-60years) than in younger age group (41-50years) in comparison to viral cirrhosis and this difference was found statistically significant [$\chi^2_{(3)} = 20.97, p < 0.001$]. Association of non-viral cirrhosis was found with hyperglycemia [$\chi^2_{(1)} = 15.65, p < 0.001$], poor glycaemic control [$\chi^2_{(1)} = 9.86, p < 0.01$] and longer duration of diabetes [$\chi^2_{(2)} = 9.51, p < 0.01$]. Non-viral cirrhosis was significantly higher (28.3%) among the diabetic patients than the non-diabetic patients who suffered more (28.3%) from viral [$\chi^2_{(1)} = 41.36, p < .001$]. The study recommends for glycemic control by leading disciplined life and taking apposite therapy for prevention of non-viral cirrhosis among diabetic patients.

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Introduction

The increasing prevalence of non-communicable diseases is a serious challenge, where the success in extending life expectancy is translated into a real threat to global health.¹ Non-communicable diseases are responsible for 60% of all deaths, 80% of these deaths are in low- and middle-income countries.² In 2000, Bangladesh had 3.2 million people with diabetes and was listed at 10, which will occupy the 7th position with 11.1 million in 2030.³ The prevalence of type 2 diabetes observed in Bangladesh was 5.2 (rural 4.3%, urban 6.9%) at 1994-5 and 11.2% (urban) and 6.8% (rural) at 2003-4.⁴ Prevalence of diabetes is just double

in urban areas due to unplanned urbanization and change in lifestyle.⁵

Cirrhosis is the twelfth leading cause of death by disease, accounting for 27,000 deaths each year.⁶ Exact prevalence of cirrhosis is unknown, but it has been estimated, through autopsies, to be between 5 and 10 percent. In countries with low alcohol consumption, hepatotropic viruses (hepatitis B and C) are the major contributors.⁷ Persons with diabetes mellitus (DM) are at an increased risk of developing a variety of liver diseases. The development of diabetes in patients

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with cirrhosis is well documented with overt diabetes present in up to 70% of cirrhotic subjects. However, evidence is emerging that the development of chronic liver disease and progression to cirrhosis may occur after the diagnosis of diabetes and that diabetes plays a role in the initiation and progression of liver injury.⁸ Non-alcoholic fatty liver disease (NAFLD), alcoholic cirrhosis, chronic hepatitis C (CHC) and haemochromatosis are more frequently associated with DM. DM increases the mortality of cirrhotic patients and has been associated with NAFLD, including its most severe form, nonalcoholic steatohepatitis (NASH).⁹

Nonalcoholic steatohepatitis (NASH) is an under-recognized cause of cryptogenic cirrhosis (CC) on the basis of higher prevalence of obesity and type II diabetes.¹⁰ NAFLD is observed principally in developed countries where sedentary lifestyle and high calorie, sugar, and fat diets lead to DM2 and obesity. Individuals with type-2 diabetes have a high (70.0%) prevalence of NAFLD, and seem to have an increased severity of disease. Prevalence of NAFLD is higher (20.0%) than that of NASH (3.0%) in developed countries and prevalence of each is presumably much higher among obese and diabetic persons because 55.0% of patients with NASH have DM2 and 95.0% are obese.¹¹

The populations of Bangladesh are exposed to a number of unfavorable conditions like sedentary lifestyles, unhealthy living conditions and stress, which make them vulnerable for presence of higher proportion of diabetes mellitus.¹² It is evident that both prevalence and incidence of diabetes mellitus is increasing in both urban and rural areas of Bangladesh but information related to cirrhosis of liver and diabetes mellitus in Bangladesh is scarce. As DM is often associated with cirrhosis of liver and its severity, it is pertinent to assess the association between cirrhosis of liver and DM in the context of Bangladesh. This study was designed to find out the proportion of viral and non-viral cirrhosis among diabetic and non-diabetic patients and accordingly to recommend suitable preventive measures to reduce the burden of diabetic cirrhosis patients.

Materials and Methods

The cross-sectional comparative study was conducted among 83 diabetic cirrhotic patients and 83 non-diabetic cirrhotic patients who were admitted in Bangladesh

Institute of Research and Rehabilitation in Diabetes and Hepatology Department of Bangabandhu Sheikh Mujibar Medical University, Dhaka respectively. The study was carried out over the period of 6 months from January to June 2010. Both diabetic and non-diabetic cirrhotic patients were included conveniently irrespective of age and sex and obtaining informed written consent. Viral and non-viral cirrhotic patients were diagnosed by viral markers and USG of whole abdomen. HbA_{1c}, fasting blood glucose and 2 hrs after breakfast were done to see glycemic control and blood glucose level of the diabetes patients.

Data were collected through face to face interview and reviewing medical documents by using pre-tested semi-structured questionnaire and checklist. Data were cleaned, edited, coded and analyzed by the SPSS software (17.0 version). Descriptive statistics included frequency, mean and standard deviation followed by Chi-square test was performed to find out the association between variables as required. p value 5% was considered significant at 95% CI and all the tests were two tailed.

Results

Mean age for diabetic patients was 56.93 (\pm 11.68) years while mean age for the non-diabetic patients was 46.19 (\pm 13.85) years. Among diabetic patients, majority were in the older age group (51-60 years)

Table-1: Socio-demographic variables between diabetic and non-diabetic patients

Socio-demographic variables	Diabetic		Non-diabetic	
	Frequency	%	Frequency	%
Age in years				
≤40	5	6.0	30	36.1
41-50	21	25.3	21	25.3
51-60	29	34.9	23	27.7
>60	28	33.7	9	10.8
Mean \pm SD	56.93 \pm 11.68		46.19 (\pm 13.85)	
Sex				
Male	50	30.12	58	34.94
Female	33	19.88	25	15.06
Religion				
Muslim	78	46.99	76	45.78
Hindu	5	3.01	7	4.22
Marital status				
Single	9	10.8	9	10.8
Married	74	89.2	74	89.2

Table-2: Distribution of patients by type of cirrhosis of liver

Type of Cirrhosis	Diabetic		Non-diabetic	
	Frequency	%	Frequency	%
Type of viral infection				
HBV	23	63.9	62	82.7
HCV	13	36.1	13	17.3
Type of non-viral cirrhosis				
Non-alcoholic fatty liver disease	37	78.7	1	12.5
Non-alcoholic staetohepatitis	7	14.9	2	25.0
Haemochromatosis	1	2.1	2	25.0
Wilson's disease	1	2.1	1	12.5
Cryptogenic	1	2.1	2	25.0

while majority of the non-diabetic patients were in the productive age group (<40years). Male, Muslim and married were predominant in both the groups. [Table-1]

Of all (166) the cirrhotic patients, 111 had viral cirrhosis and 55 patients had non-viral cirrhosis. HBV infection was dominant in both diabetic (63.9%) and non-diabetic patients (82.7%) while majority (78.7%) of the diabetic patients suffered from non-alcoholic fatty liver disease. [Table-2]

Mean age for developing viral cirrhosis was lower (48.75 ± 13.01 years) than the mean age for developing non-viral cirrhosis (57.24 ± 13.89 years). Majority (32.4%) of the cirrhotic patients of viral origin were in the age group of 41-50 years while majority (41.8%)

Table-3: Distribution of socio-demographic variables by cirrhosis of liver

Socio-demographic variables	Viral cirrhosis		Non-viral cirrhosis		p-value
	Frequency	%	Frequency	%	
Age in years					
≤40	29	26.1	6	10.9	<0.001
41-50	36	32.4	6	10.9	
51-60	29	26.1	23	41.8	
>60	17	15.3	20	36.4	
Mean±SD	48.75 ± 13.01		57.24 ± 13.89		
Marital Status					
Single	7	6.3	11	20	0.008
Married	104	93.7	44	80	

Table-4: Distribution of diabetic patients by diabetes characteristics

Characteristics	Viral Cirrhosis		Non-viral Cirrhosis		p-value
	Frequency	%	Frequency	%	
Glycaemic control					
Poor					
(HbA _{1c} >8%) ¹⁷	9	25	28	59.6	0.002
Good to fair					
(HbA _{1c} 6-<8%) ¹⁷	27	75	19	40.4	
Blood glucose level					
Normoglycaemic					
(FBS <7mmol/L or 2hrsABF <11.1mmol/L) ¹⁸	24	66.7	11	23.4	<0.001
Hyperglycaemic					
(FBS ≥7mmol/L or 2hrsABF ≥11.1mmol/L) ¹⁸	12	33.7	36	76.6	
Duration of diabetes in years					
<5	16	44.4	8	17.0	0.009
6-15	17	47.2	26	55.3	
>16	3	8.3	13	27.7	

of the cirrhotic patients of non-viral origin were in the age group of 51-60 years and this difference was found statistically significant [$\chi^2_{(3)} = 20.97$, $p < .001$]. Both viral and non-viral cirrhosis were significantly higher among married patients [$\chi^2_{(1)} = 7.133$, $p < .05$]. Though both viral (66.7%) and non-viral (61.8%) cirrhosis were predominant among the males than their counterpart females but this sex differential was not statistically significant [$\chi^2_{(1)} = 0.38$, $p = 0.54$]. Non-viral cirrhosis was significantly higher among the patients with hyperglycemia (76.6%) [$\chi^2_{(1)} = 15.65$, $p < .001$], poor glycaemic control (59.6%) [$\chi^2_{(1)} = 9.86$, $p < .01$] and

Table-5: Relationship between diabetes mellitus and cirrhosis of liver

Diabetes status of the patients	Viral Cirrhosis		Non-viral Cirrhosis		χ^2 test		
	N	%	N	%	χ^2	df	p value
Diabetic	36	21.7	47	28.3	41.36	1	<0.001
Non-diabetic	75	45.2	8	4.8			

longer duration of diabetes (83.0%) [$\chi^2_{(2)}=9.51$, $p < .01$]. [Table-4] Among the diabetics, majority (28.3%) patients had non-viral cirrhosis while 21.7% had viral cirrhosis while majority (45.2%) of the non-diabetes patients had viral cirrhosis and only 4.8% had non-viral cirrhosis and this difference was statistically significant [$\chi^2_{(1)}=41.36$, $p < .001$].

Discussion

The cross sectional comparative study was aimed to assess the relationship between cirrhosis of liver and diabetes mellitus and to find out the underlying causes of cirrhosis of liver among 83 diabetes and 83 non-diabetes patients.

Mean age for diabetes patients and non-diabetes patients was 56.93(± 11.68) and 46.19(± 13.85) years respectively. Among diabetic patients, majority (34.9%) were in the age group of 51-60 years while majority (36.1%) of the non-diabetic patients were in the age group of <40 years. Similar finding was obtained in a study conducted by Hashem B, El-Serag, Thomas T and James E where patients with diabetes were older (62 Vs 54 years) than patients without diabetes.¹³ As per BBS (2008), most (90%) of the people of Bangladesh are Muslims¹⁴ and similar finding was revealed by the current study where Muslim constituted (92.77%).

The current study estimated 51.2% HBV and 15.7% HCV infections among diabetes patients. Previously reported by Pazhanivel M and Jayanthi V diverse findings where HBV infection was 18.38% and HCV infection was 6.01% among DM patients.¹⁵ This variation may be due to unawareness and transfusion of un-screened blood and blood products in our country.

Among diabetic patients, majority (78.7%) had non-alcoholic fatty liver disease, 14.9% patients had non-alcoholic steatohepatitis, and each 2.1% patients had haemochromatosis, Wilson's disease and cryptogenic cirrhosis. The study findings are different from the findings of the study conducted by Amarapurkar D which found 18.9% NASH, and 22.6% cryptogenic cirrhosis.¹⁶ No statistically significant sex difference of occurrence of cirrhosis of liver was found but statistically significant association was revealed between marital status and cirrhosis of liver because both viral and non-viral cirrhosis were higher in married patients [$\chi^2_{(1)}=7.13$, $p < .01$]

It was also found that majority (28.3%) diabetes patients had non-viral cirrhosis while majority (45.2%) of the non-diabetes patients had viral cirrhosis and this difference was found statistically significant [$\chi^2_{(1)}=41.36$, $p < .001$]. But the study conducted by Amarapurkar D found majority of both diabetic (34.9%) and non-diabetic (28.2%) had non-viral cirrhosis.¹⁶

Conclusion

Older age group, males, Muslims, illiterates and married were predominant among the DM patients. Majority of the cirrhotic patients of viral origin were in the middle age group while majority of the cirrhotic patients of non-viral origin were in the older age group. Longer duration of DM, hyperglycaemic status and poor glycemic control were significantly associated with occurrence of liver cirrhosis. Non-viral cirrhosis of liver was more common among diabetics especially among the patients with sedentary lifestyle and HBV infection was predominant among the cirrhotic patients. The study recommends for specific measures like early detection and prompt treatment of DM, measures for enable the DM patients to lead disciplined life to maintain euglycemia and to raise their awareness regarding vaccination, lifestyle and safe blood transfusion.

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