

STUDY OF HEPATIC DYSFUNCTION IN TYPE 2 DIABETES MELLITUS

Medicine

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Corresponding Author

Dr. Abdul Hameed Abdul Shikur Chaudhari,
Professor, Department of General Medicine, Pacific Institute of Medical Sciences, Udaipur, Rajasthan (India)
Email: hameed2020ac@gmail.com

Shehnaz Shaikh¹, Abdul Hameed Abdul Shikur Chaudhari²
¹ - Assistant Professor, Department of Physiology
² - Professor, Department of General Medicine
Pacific Institute of Medical Sciences, Udaipur, Rajasthan (India)

Abstract:

Background: Diabetes Mellitus (DM) is a Panmetabolic Disorder related with the life style. It is affecting silently and putting lot of Health burden extensively due to its wide range of complications. Apart from the common complications in T2 Diabetes Hepatic Dysfunction, the spectrum of which ranges from clinically Asymptomatic with Steatosis to NASH, NAFLD, Cirrhosis and rarely, Hepatocellular Carcinoma.

Methods: This cross-sectional study was carried out in 100 patients from the General Medicine OPD at Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan who were selected based on certain inclusion and exclusion criteria. After clinical evaluation, routine haematological and radiological investigations in type 2 diabetic patients, mainly Liver Function Tests, CBC, Sonography of the abdomen, ECG, Urine Analysis, Anthropometric measurements, etc were noted.

Results: The duration of Diabetes was compared with the USG abdomen which came positive for fatty liver. Approximately 20% patients of type 2 DM had symptoms of dull aching pain and 20% patients had hepatomegaly on palpation, which is clinically significant. 30% of the total study group was detected having fatty liver. Prevalence studies on this study group shows that 22% of the patients having diabetes < 5 years, 44% of the patients having diabetes for >10 years and 34% of patients in the duration range of 6-10 years shows fatty liver on ultrasound of abdomen.

Conclusion: Hepatic involvement in T2 DM is correlated with BMI, Deranged Blood Sugar levels, Early nephropathy and presence of retinopathy had significant clinical correlation with in this study. There is a positive prevalence of liver dysfunction as detected on sonography of the abdomen, in patients with type 2 DM. A significant correlation was obtained between fasting blood sugar and BMI. This suggests that tight glycemetic control is the key factor in preventing its complications.

Keywords: Diabetes Mellitus, hepatic dysfunction, liver.

Introduction

Diabetes Mellitus is one of the Lifestyle disorder & known as a 'Silent Killer' because of its silent patho-physiological damages in the form of microangiopathic and macroangiopathic complications. Its common long term complication

includes Cardiovascular disease, Diabetic Nephropathy, Diabetic Retinopathy, Peripheral Neuropathy, Liver dysfunction & recurrent infection.

The most common clinical presentation is hepatomegaly, and most patients have normal or only mildly abnormal transaminases and

normal bilirubin. Since hepatic involvement in a type 2 diabetic patient can range anywhere between clinically asymptomatic with steatosis to NAFLD, NASH, Cirrhosis or rarely Hepatocellular Carcinoma¹.

Cirrhosis was the fourth leading cause of death and accounted for 4.4% of diabetes-related deaths.² Thus, it is important to have necessary biological markers and investigations for the early detection and diagnosis of liver dysfunction in this condition.² This pilot study therefore, is a step towards recognising and understanding which tool can be used as a feasible marker for diagnosis of hepatic involvement in T2DM.

Liver biopsy is the gold standard diagnostic test but not acceptable as a screening. It is reserved for situations of conflicting diagnosis.²

Liver ultrasonography (USG), although not sensitive enough to differentiate simple steatosis from more advanced hepatic involvement like NASH, is widely used as it is a feasible tool and non-invasive, hence compliance of the patients is much better as compared to liver biopsy. It is also affordable for most of the patients. Biochemical markers like AST/ALT, alkaline phosphatase, total bilirubin have been used in the study as a probable tool of detection of hepatic involvement in type 2 DM.

In a study by Kalra S, prevalence of NAFLD was found to be approximately 9-32% in the general Indian population, and a higher incidence was found in obese and diabetic patients.³

Hence this present study was aimed to review the extent of hepatic involvement in patients with type 2 diabetes mellitus, to assess the association of hepatic dysfunction with the duration of diabetes and to assess its association with metabolic syndrome.

The prevalence of hepatic dysfunction in subjects in accordance with duration of diabetes (less than 5 years, 5-10 years, more than 10 years).

Furthermore, early detection and treatment will reduce the healthcare and economic burden on the individual, community and the nation.

Methods

This cross-sectional study was carried out over a period of 6 months from July 2019 to December 2019 in 100 patients who fulfilled the inclusion and exclusion criteria and attending general medicine OPD during study period at Pacific Institute of Medical Sciences, Udaipur. Study was carried out with appropriate patient consent.

Inclusion criteria

Type-2 diabetic adult of either sex or age >30 years and asymptomatic for liver disease.

Exclusion criteria

All patients with type-1 diabetes mellitus, past/present history of chronic alcohol consumption, current history of Anti-Koch's therapy, past history of hepatitis or other hepatobiliary disease, history of consumption of any other drugs except oral hypoglycemic agents and anti-hypertensives and history of congestive cardiac failure, renal failure are excluded.

Methodology of the study was carried after a detailed history of all the patients in the study group, any present clinical symptoms especially dull aching pain in right hypochondriac region was noted.

In general examination BMI, waist, hip ratio, acanthosis nigricans were noted. In systemic examination, emphasis was given to presence of hepatomegaly, if any. Patients were grouped in three groups. Group 1 (\leq 5 years), Group 2 (6-10 years) and Group 3 (more than 10 years).

Biochemical parameters- Hb, CBC, Liver function test (AST/ALT/total bilirubin), Fasting & Post-prandial Blood Sugar, Cholesterol, Triglycerides, Urine – routine and microscopy especially for presence of Albuminuria as a marker of Early Nephropathy, ECG, Fundoscopy for evidence of Retinopathy and USG abdomen for assessment of extent of fatty liver or cirrhosis.

Results

A total of 100 patients (70 males and 30 females) consented

for the participation with a mean fasting blood sugar-186.45 mg/dl and mean post-prandial blood sugar 255.5 mg/dl. 20% patients had symptoms of dull aching pain and 20 (20%) patients had hepatomegaly on palpation, which is clinically significant using USG abdomen (Table 1).

Table 1: Presence of fatty liver with duration of type 2 DM

USG Abdomen	Duration of DM <5	6 - 10 Years	>10 Years	Total
Fatty Liver	7	10	13	30
Normal	15	11	14	40
Total	22	34	44	100

30 (30%) of the study group was detected having fatty liver. 22% of the patients having diabetes less than 5 years, 34% of patients in the duration range of 6-10 years and 44% of the patients having diabetes for more than 10 years have fatty liver. Statistical correlation of liver enzymes (AST, ALT, Sr. bilirubin) did not yield definite results. The p value was >0.05 for correlation of deranged liver enzymes with duration of diabetes for all three liver enzymes tested (AST, ALT, Sr. bilirubin) (Figure 1-3). A positive correlation has been noted in association of duration of DM with presence of DMR, with 4% of the patients having DM ≤5 years have DMR, 6% of patients having DM from 6-10 years and 7% in the third group of duration more than ten years have evidence of retinopathy (Table 2).

Table 2: Distribution of DMR with duration of type 2 DM

Fundoscopy	Duration of DM <5	6 - 10 Years	>10 Years	Total
DMR	4	6	7	17
Normal	18	28	37	83
Total	22	34	44	100

The correlation between the presence of fatty liver with evidence of DMR in the study group shows 60% of patients who have fatty liver are also affected with DMR whereas, 15% of patients who do not show presence of fatty liver in the USG have evidence of DMR. 53% of the patients with presence of fatty liver had albuminuria.

20% of the patients who had normal USG also showed albuminuria, which may have been due to long standing diabetes and/or presence of nephropathy singly

An association has been seen between the diabetic retinopathy and diabetic nephropathy with hepatic involvement.

There is a positive correlation between BMI and deranged fasting and post-prandial blood sugar with p value <0.0001 in both cases thus being extremely significant.

66% of patients with hepatic involvement had obesity, 50% had hypertension, 87% had dys-lipidaemia which are the markers of metabolic syndrome.

Discussion

The duration of diabetes was compared with the count of USG abdomen which came positive for fatty liver. The results when analysed showed that there is a positive correlation of hepatic dysfunction with diabetes mellitus.¹⁻⁴ There seems to occur a higher proportion of fatty liver in those who have had diabetes for a period of more than ten years, but this should be corroborated after extensive research with a larger sample size.

Most of the diabetic patients are asymptomatic, but few may have symptoms of dull aching pain in right hypochondriac region as early presentation of fatty liver. It can be demonstrated clinically by palpation for hepatomegaly. From prevalence studies with data collected using USG abdomen, 28% of the total study group was detected having fatty liver, 24.14% of the patients having diabetes less than 5 years, 31.25% of patients in the duration range of 6-10 years and 40% of the patients having diabetes for more than 10 years have fatty liver.

Correlation of LFT results (AST, ALT, S. total bilirubin) with duration of diabetes did not have much significance and the values were not deranged to a significant level even with patients having diabetes for more than ten years. Hence, these biochemical markers are not sufficient for detection of hepatic involvement in T2DM.

Also there is a positive correlation between the duration of diabetes and evidence of DMR. 4% of the patients in the first group (≤5 years) have DMR, 6% in the second group (6-10 years) and 7% in the third group of duration more than ten years have evidence of DMR. The number of studies showing this correlation are very few and scattered, hence this is an important correlation that will help the physician detect and treat early any complications like above that may arise. 53% of the patients with presence of fatty liver had albuminuria.

It is observed that micro-angiopathic complications are associated with hepatic dysfunction in diabetics. All these results should be corroborated with studies on a larger scale as the data collected was insufficient to make a near accurate prediction. Complete LFT should be done as studies show that the values are deranged for advanced cases. Increase in GGT may be among the earliest biochemical markers, but corroboration of the same was not possible in this study.² Hyperbilirubinemia, prolongation of the prothrombin time and hypoalbuminemia are infrequent, although AST/ALT ratio of <1 is seen^{3,4}. Liver biopsy is the gold standard for diagnosing NAFLD along with clinicopathological correlation.^{5,6}

In particular central obesity has been described as one of the strongest risk factors for NAFLD and fibrosis, with NASH being prevalent in 18.5% of the obese patients. 7 (50%) had hypertension, 12 (85%) had dyslipidaemia which are the markers of metabolic syndrome.^{7, 8}

Conclusion

Prevalence of hepatic dysfunction in type 2 DM showed a significant presence of liver involvement in 5 years of duration. Its possible to detect hepatic dysfunction in Type-2 Diabetes on Clinical Background, USG Abdomen.

A significant correlation was obtained between deranged Fasting blood sugar and BMI. There was also a significant correlation between PPBS and BMI.

This study suggests that tight glycaemic control plays an important role in preventing complications of diabetes like metabolic syndrome, central obesity and hepatic involvement. Gradual weight loss and good control of blood glucose levels is recommended for patients with steatohepatitis.

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