ORIGINAL ARTICLE

Higher Incidence of Diabetes in Asymptomatic Healthy Fatty Liver Patients of Bangladesh: Prompt Intervention can Avert Complications

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Abstract

Background: The strong association between type 2 diabetes mellitus (T2DM) and fatty liver is well known, and its nomenclature has even recently changed to metabolic dysfunction-associated steatotic liver disease (MASLD). Healthy MASLD patients are frequently overlooked and maltreated, especially in Bangladesh. In this present study, we tried to correlate T2DM burden in apparently healthy, incidentally diagnosed fatty liver patients on ultrasound.

Materials and methods: This cross-sectional study was done in Sheikh Hasina Medical College Hospital, Tangail, Bangladesh, from August 2022 to February 2023. A total of 92 patients with ultrasonological evidence of grade II fatty change in the liver were included and evaluated. Known T2DM, hypothyroidism, consumption of alcohol, HBV or HCV infection, Wilson's disease, autoimmune liver disease, hemochromatosis, and any other chronic liver or kidney disease patients were excluded. The patients were then assessed for the presence and absence of T2DM using OGTT (2 hours 75 gm glucose ≥ 11.1 mmol/L) and/or HbA1c (≥6.5%) as diagnostic criteria. Data was analyzed by SPSS, version 23.

Results: Out of 92 patients, 48 were male and 44 were female. A total of 50 patients (54.3%) were newly diagnosed with T2DM. Statistically significant differences were seen in the T2DM group and non-DM group for AST (50.33 IU vs 36.53 IU) and TG (270 mg/dL vs 189 mg/dL). Although no noteworthy differences were evident in mean age (41 years vs 38 years), ALT (58.9 IU vs 60.23 IU), and BMI (28.85 vs 29.29).

Conclusions: In the present study, more than 54% of patients with grade II fatty liver were newly diagnosed with T2DM. They would later present with more advanced T2DM and related complications. Although a larger study is needed, physicians and healthcare workers in Bangladesh should be more concerned about treating MASLD patients with early diagnosis of T2DM, recommending prompt lifestyle interventions, and prescribing drugs if necessary.

Keywords: Fatty liver, Metabolic dysfunction-associated steatotic liver disease, Steatohepatitis, Type 2 diabetes mellitus.

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Introduction

The prevalence of type 2 diabetes mellitus (T2DM) and related complications is rising worldwide.[1] Lifestyle changes and urbanization have also progressively increased the number of T2DM patients in South Asian countries.[2] Type 2 diabetes mellitus-related health complications threaten to reduce economic gains in third-world countries like Bangladesh.[3]

Metabolic dysfunction-associated steatotic liver disease (MASLD) and T2DM frequently coexist. Insulin resistance is caused by the liver, which in turn causes MASLD and T2DM. Thus, the pathophysiology of both disorders is caused by the liver. Additionally, MASLD increases the likelihood of T2DM complications, which explains why finding MASLD is more common in T2DM patients[4].

The prevalence of MASLD has been increasing progressively over the past years due to the higher prevalence of obesity, physical inactivity, and metabolic syndromes. Type 2 diabetes mellitus represents the risk factors of MASLD. Almost half the patients with T2DM are detected with MASLD, thus there is a reliable relationship between them.[5,6]

Cardiovascular events in MASLD are increased by 1.87-fold in the presence of T2DM.[7] The global prevalence of MASLD is estimated to be 24% at present, with the highest rates in South America (31%) and the Middle East (32%), followed by Asia (27%), the USA (24%), and Europe (23%) [8] In Bangladesh, the prevalence of the metabolic syndrome was 30% in the general population.[9]

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The effect of MASLD on the incidence of T2DM risk has been investigated in several studies. The most recent one published in February 2024 showed that MASLD is associated with a 6.1-fold increased T2DM risk in young adults in Korea. Type 2 diabetes mellitus incidence was the highest in BMI ≥ 23 and in metabolic syndrome according to their study.[10]

A nationally representative survey in Bangladesh showed that the overall age-standardized prevalence of diabetes was 12.8%. Among them, 61.5% were unaware that they had the condition.[11]

Although the prevalence of metabolic syndrome is high and rising in Bangladesh, the degree to which MASLD may increase the risk of incidental T2DM is still unknown.

Table 1: Sociodemographic characteristics of the study population ($n = 92$)

Mean age of the study population	
Mean age	41.62 ± 9.73 years
BMI of the study population	
T2DM group	28.92 ± 4.68
Nondiabetic group	29.19 ± 4.82
Sex of the study population	
Male	48
Female	44
Percentage of patients according to diagnosis	
Newly diagnosed T2DM	54.3%
Nondiabetic patients	45.7%

Materials and Methods

A total of 92 patients, aged between 20 and 65 years with ultrasonographic (USG) evidence of grade II fatty change in the liver were enrolled in this cross-sectional study. This single-center study was conducted from August 2022 to February 2023 at Sheikh Hasina Medical College Hospital, Tangail, a tertiary care hospital in Bangladesh. After taking informed written consent, a total of 92 patients, aged between 20 and 65 years with USG evidence of grade II fatty change in the liver were enrolled in this cross-sectional study. Ethical approval was obtained from the institutional Ethics Committee.

After taking informed written consent, known T2DM, hypothyroidism, alcohol abuse, HBV or HCV infection, Wilson's disease, autoimmune liver disease, hemochromatosis, and any other chronic liver or kidney disease patients were excluded. The patients were then assessed for the presence and absence of T2DM using OGTT (2 hours 75 gm glucose ≥ 11.1 mmol/L) and/or HbA1c (≥6.5%) as diagnostic criteria.

Anthropometric Measurement, Laboratory Test, and Ultrasound Evaluation

Anthropometric measurements were performed by investigators using the standard protocol. The height and weight of participants were measured with casual clothes and without shoes. BMI was calculated as weight/height^2 in kg/m^2 units. All laboratory tests were done in the biochemistry department of the medical college hospital. The USG feature of MASLD was determined based on the presence of a bright hepatic echotexture compared to that of kidneys and the blurring of intrahepatic vessels. All USG procedures were performed by the same specialist radiologist.

Statistical analysis was done by SPSS, version 23 (IBM, SPSS Inc.) A $p < 0.05$ value was considered statistically significant.

Results

Table 1 shows the socio-demographic characteristics of the study population. Based on OGTT and/or HbA1c, the study population was divided into T2DM and non-DM groups. A total of 50 patients (54.3%) were newly diagnosed with T2DM.

Figure 1 shows ALT of the participants. It is found that ALT (IU/L) mean value differences between T2DM and non-DM groups were 60.23 and 58.9 IU/L, respectively ($n = 92$) and $p \geq 0.05$ (not significant).

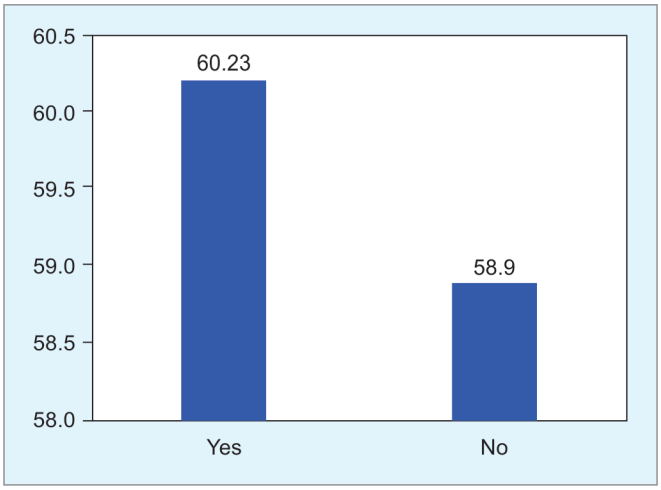

Fig. 1: ALT (IU/L) mean value differences between T2DM and non-DM group ($n = 92$)

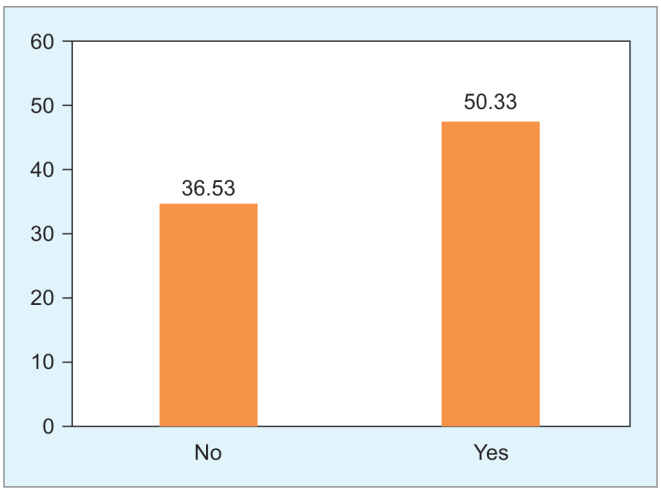

Fig. 2: AST (IU/L) mean value differences between T2DM and non-DM group ($n = 92$)

Figure 2 shows the AST value of patients. In this study, the AST value of patients was higher in the T2DM group than non-DM groups (50.33 vs 36.53 IU/L) and it was statistically significant ($p < 0.05$).

Figure 3 resembles TG mean value differences between T2DM and non-DM groups. It is evident that the TG value of patients was higher in the T2DM group (270 mg/dL vs 189 mg/dL), and it was statistically significant ($p < 0.05$) compared to non-DM groups.

Figure 4 illustrates the total cholesterol, LDL, and HDL values of T2DM and non-DM groups. In this study, total cholesterol in T2DM and non-DM groups were (197 vs 194), LDL value (108 vs 115), and HDL value (38 vs 40) (mg/dL) all were statistically similar in both groups.

Discussion

In the last few years, the mortality rate has risen significantly at an alarming rate in developing countries including Bangladesh.[12,13] Due to economic growth, Bangladesh has rapidly accelerated city development in recent years.[12,14] This development and

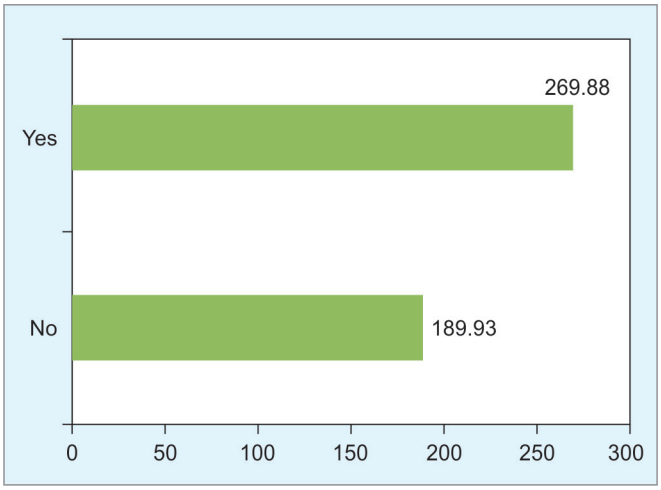

Fig. 3: Mean value differences in TG between T2DM and non-DM group

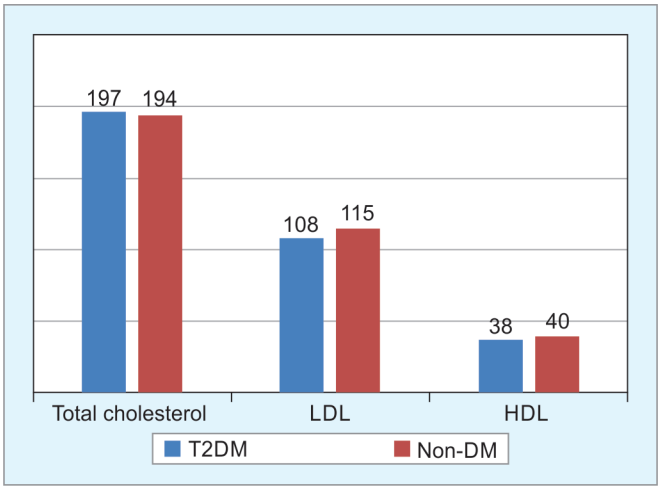

Fig. 4: Total cholesterol, LDL, and HDL values of T2DM and non-DM groups

urbanization raises the concern that the chronic disease burden may show an increasing trend in the future, especially by changing food habits along with increased intake of processed food, irregular food intake, sedentary lifestyle, and so on.[15]

In this study, Bangladeshi adults (mean age 39.62) were examined for the clinical association between MASLD and an increased risk of T2DM. The findings of this study demonstrated that 54.3% of MASLD patients had T2DM in their young adult years. These patients were not known to have T2DM. This is a major finding within our study sample. It was much higher than that of the Global study by Younossi.[8] They found that the prevalence of T2DM among the MASLD and MASH patients is estimated to be 22.51% and 43.63%, respectively.[8,16]

In our study, we included and studied patients from urban areas, and we found that there were no significant age or sex differences in terms of T2DM development between the two groups. This is consistent with the previous study done by Akhtar et al.[17] They showed that the prevalence of T2DM in Bangladesh was significantly higher in urban areas without any significant gender differences.[17]

In the current study, T2DM and non-DM patients had higher mean BMI (28.85 vs 29.29 kg/m^2) than normal people and both groups of patients were overweight. They had altered liver function in terms of normal values. ALT values between the two groups were 58.9 vs 60.23 international units/L (IU/L). Normal ALT values are 29–33 IU/L for males and 19–25 IU/L for females.[18] Mean ALT level was around two to three times higher than normal values in both groups. These findings have an important prognostic value, as a greater ALT level indicates that MASLD will have more chance to proceed to MASH.

The value of AST was much higher in the T2DM group than in the non-DM group (50.33 vs 36.53 IU/L) and it was statistically significant ($p < 0.05$). This is also higher than normal AST values (10–40 IU/L for males and 9–32 IU/L for females).[18]

Both groups exhibited dyslipidemia, and the T2DM group had greater triglyceride (TG) levels (270 mg/dL vs 189 mg/dL), these findings were statistically significant ($p < 0.05$), and they were much higher than normal TG values (<150 mg/dL).

High-density lipoprotein values were also found ≤40 mg/dL in both groups, at a lower level than desirable. All these findings are suggestive of the presence of metabolic syndrome in both groups.

This study is the first to show that there is a higher incidence of T2DM in grade II fatty liver patients of Bangladesh, notably in this age range. These young people in Bangladesh are the only ones who can support their families financially. As a result, early detection of T2DM not only saves their families but also safeguards this developing country from the enormous expenditures associated with T2DM-related mortality and morbidity.

However, the main limitations of this study included a small sample size, short duration of trial, and lack of a control group.

Conclusions

These results highlight the importance of beginning early intervention in those with MASLD to reduce the likelihood of developing T2DM and its complications. It is imperative to maintain ongoing monitoring and implementation of efficient early diagnosis and preventive and control strategies, with a specific emphasis on reducing obesity. Although a larger study is needed, physicians and healthcare workers in Bangladesh should be more concerned about treating MASLD patients with early diagnosis of T2DM, prompt lifestyle interventions, and prescribing drugs if needed.

Ethics Committee Approval

This study was reviewed and approved by the Institutional Review Board.

Author Contributions

Concept – SG; Design – SG, MR, SA; Supervision – SA, AAM; Materials – SG, MR, AAM; Data Collection and/or Processing – SG, SA, MR, AAM; Analysis and/or Interpretation – MR, SA; Literature Search – SG, MR; Writing – SG, MR; Critical Reviews – SG, RA, AAM.

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