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ORIGINAL RESEARCH

Ultrasonographic Evaluation of Cardiovascular and Fatty Liver Diseases in Type 2 Diabetic Patients: A Prospective and Observational Study

Anshuman Anand

Associate Professor, Department of Radiology, MGM Medical College, Kishanganj, Bihar, India

Correspondence:
Anshuman Anand
Associate Professor, Department of Radiology, MGM Medical College, Kishanganj, Bihar, India

ABSTRACT

Aim: Using ultrasound to examine individuals with type 2 diabetes having fatty liver disease and cardiovascular diseases.

Methods: The prospective and observational study was carried out during a nine-month period in the Radiology Department of the MGM Medical College, Kishanganj, Bihar. A total of 300 patients with type 2 diabetes who had abdominal ultrasonography that revealed no other co-morbid conditions and fatty alterations in the liver were included. According to how long the patients had been diagnosed with diabetes, the patients were separated into three groups. Interview schedule questionnaire, OPD records, bedside tickets, physical examination, and laboratory measures made up the study's methodology.

Results: 145 (48.3%) of the 300 patients were men, and 155 (51.7%) were women. The majority (39%) of the patients were between the ages of 50 and 60, while 25.7% of them were between the ages of 40 and 50. 18.3% of the population was between 60 and 70 years old, 10.7% was under 40, and 6.3% was older than 70. 75 (25%) of the 300 cases had non-fatty liver, while 225 (75%) of the cases had fatty liver. 33.4% (100) of the patients who were included belonged to group A, 40% (120) to group B, and 26.6% (80) to group C. The majority of patients (230, 76.7%) did not show ischemia alterations, however 70 (23.3%) cases out of 300 patients did.

Conclusion: Every patient with newly diagnosed type 2 diabetes should consider having a liver ultrasound because NAFLD is particularly common in this population of patients. It may be claimed that in those with type 2 diabetes, there was a correlation between cardiovascular risk factors and NAFLD.

Keywords: Cardio-vascular risk, Non-alcoholic fatty liver disease, Type 2 diabetes.

INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD), which affects over 30% of adults globally [1], has grown to be a significant public health issue. Simple hepatic steatosis (NAFL) to nonalcoholic steatohepatitis (NASH), which can progress to liver cirrhosis and liver fibrosis, as well as an increased risk of liver-related complications like end-stage liver disease, hepatocellular carcinoma, the need for a liver transplant, and liver-related mortality, are all included in the broad spectrum of conditions that make up NAFLD. Since NAFLD increases the risk of developing extra-hepatic complications like cardio-metabolic diseases like type 2 diabetes mellitus (T2DM), dyslipidemia, metabolic syndrome, and cardiovascular diseases (CVD), there is strong evidence that the global burden of NAFLD extends beyond liver-

related complications [2,3]. Indeed, it is now well-established that CVD is the main killer of NAFLD patients.

Since they are the main causes of death worldwide, CVDs such ischemic heart disease and stroke are also significant public health costs. Approximately 17.9 million fatalities per year, or 31% of all deaths worldwide, are caused by CVDs [4]. Therefore, it is essential for public health policy to focus on CV prevention as well as the early detection and management of established cardiovascular risk factors (CVRF), such as dyslipidemia, type 2 diabetes, and hypertension.

T2DM is a common finding in NAFLD and has long been recognised as an independent CVRF. NAFLD is present in about 60% of T2DM patients. In fact, macrovascular complications are the main cause of death in T2DM patients [5], and studies have shown that rigorous glycemic control strategies lower the risk of these complications compared to a less intensive approach [6]. Numerous studies have emphasised the significant interaction between NAFLD and T2DM and describe the intricate bidirectional relationship between the two conditions. T2DM is linked to an increased incidence of hepatocellular carcinoma, and the combination of these two illnesses negatively affects the course and prognoses of both diseases [7].Additionally, compared to patients with T2DM alone, patients with T2DM and NAFLD had a higher risk of CVD. This implies that patients with both diseases may experience a synergistic increase in CV risk [8].

METHODS

For nine months, the prospective and observational study was carried out in the Department of Radiologyat MGM Medical College, Kishanganj, Bihar. With no other co-morbid conditions, 300 patients with type 2 diabetes were included who had an ultrasound of the abdomen that revealed fatty alterations in the liver. According to the length of time since the diabetes diagnosis, the patients were split into three groups.

After obtaining consent, a single radiologist performed an ultrasonographic evaluation of the study subjects and looked at the following parameters: liver echogenicity, portal vein doppler study, mesenteric fat pad thickness, and carotid artery doppler study. A brief history of the patient's complaints, random blood sugar, and BMI values were also recorded. Interview schedule questionnaire, OPD records, bedside tickets, physical examination, and laboratory measures made up the study's methodology. According to how long ago a person was diagnosed with diabetes, the study population was separated into three groups. GROUP A had a distribution of less than five years, GROUP B had a distribution of five to ten years, and GROUP C had a distribution of more than ten years.

RESULTS

145 (48.3%) of the 300 patients were men, and 155 (51.7%) were women. The majority (39%) of the patients were between the ages of 50 and 60, while 25.7% of them were between the ages of 40 and 50. 18.3% of the population was between 60 and 70 years old, 10.7% was under 40, and 6.3% was older than 70. 75 (25%) of the 300 cases had non-fatty liver, while 225 (75%) of the cases had fatty liver.

Table1: Age distribution

Age	Fatty liver	%	Non-Fatty liver	%	Total	%	P value
<40	21	7	11	3.7	32	10.7%	0.3846
40-50	52	17.3	25	8.3	77	25.7%	
50-60	89	29.7	28	9.3	117	39%	
60-70	45	15	10	3.3	55	18.3%	
>70	18	6	1	0.4	19	6.3%	
Total	225	75	75	25	300	100	

33.4% (100) of the patients who were included belonged to group A, 40% (120) to group B, and 26.6% (80) to group C. The majority of patients (230, 76.7%) did not have ischemia alterations, however 70 (23.3%) cases out of the 300 patients did.

Table2: Prevalence of ischemic changes in ECG with the duration of diabetes

Duration of diabetes	Ischemic changes in ECG			P-value
	Absent	Present	Total	
GroupA(<5years)	86(28.7%)	14(4.7%)	100(33.4%)	0.2477
GroupB(5-10years)	83(27.7%)	37(12.3%)	120(40%)	
Group C(>10years)	61(20.3%)	19(6.3%)	80(26.6%)	
Total	230(76.7%)	70(23.3%)	300(100%)	

Out of 300 patients, 38 patients (12.7%) had no LVDD (Left Ventricular Diastolic Dysfunction), 79 had Grade 1, 140 had Grade 2, and 43 (14.3%) had Grade 3 LVDD.

Table 3: Prevalence of LVDD with duration of diabetes

Duration of diabetes	LVDD				Total	P-value
	No	Grade1	Grade2	Grade3		
GroupA(<5years)	16(5.3%)	35(11.7%)	38(12.7%)	11(3.7%)	100(33.4%)	0.4354
GroupB(5-10years)	21(7%)	31(10.3%)	50(16.7%)	18(6%)	120(40%)	
Group C(>10years)	1(0.3%)	13(4.3%)	52(17.3%)	14(4.7%)	80(26.6%)	
Total	38(12.7%)	79(29.7%)	140(46.7%)	43(14.3%)	300(100%)	

DISCUSSION

NAFLD is significant for the development of CVD since it is linked to metabolic syndrome and independently linked to cardiovascular disease through a number of shared risk factors. These independent risk factors, which may also include hereditary factors, atherogenic dyslipidemia, chronic inflammation, and an imbalance of procoagulant and anticoagulant substances, could speed up atherogenesis.

Using ultrasound techniques, it is possible to measure the carotid artery's intima-media thickness (IMT) non-invasively. It has been established that an elevated IMT raises the risk of myocardial infarction and stroke. The IMT in NAFLD patients rose 0.16 mm compared to the control group, and the risk of carotid plaque was 3.73 times higher than that of the controls, according to a meta-analysis by Cai J et al. of 7 research on Carotid IMT [9].Furthermore, a study by Wang et al. revealed that in people with fatty livers, ALT level is proportionally linked with the risk of carotid IMT [10]. Furthermore, regardless of age, sex, BMI, smoking, LDL cholesterol, insulin resistance, and the existence of the metabolic syndrome, the severity of the liver's histology in NAFLD patients is substantially correlated with early carotid atherosclerosis [11].

Atherosclerosis's carotid intima medium thickness (CIMT) phenotype has received extensive research. The CIMT can be swiftly, non-invasively, and inexpensively evaluated using B mode ultrasound [12].

Similar to the prevalence in the current study, a study by Jayaramaet al. found that type 2 diabetes patients had a prevalence of NAFLD of 60% [13]. The prevalence of NAFLD in type 2 diabetic patients according to gender was not significantly different in this investigation, and the findings were consistent with those of Prashanth et al[14]. NAFLD ultrasonographic characteristics are thought to be a standalone risk factor for CVD, including coronary heart disease, hypertension, heart failure, and stroke [15-18].According to Hamaguchiet al. [19], patients with ultrasound evidence of NAFLD had a greater prevalence of acute cardiovascular events. Numerous research findings imply that fatty liver worsens the

relationship between type 2diabetes and subclinical atherosclerosis and the metabolic syndrome [20].

CONCLUSION

Strong evidence of the link between NAFLD and a higher risk of CVD is provided by the data given in this review. Assessments of the individual effects of T2DM and NAFLD and its later phases on the risk of CVD remain hard given the close link between CVD, T2DM, and NAFLD. However, research done on T2DM patients has indicated that having both conditions tends to raise the risk of CVD. The possible synergistic effect of T2DM and NAFLD on CVD is supported by a number of shared pathophysiological mechanisms. According to this, people who have both T2DM and NAFLD should be regarded as having a high risk of developing CVD and may benefit from more intense CVD prevention efforts. Additionally, a number of anti-diabetic treatments have demonstrated favourable effects on either or both NAFLD and CVD. When treating patients with T2DM on an individual basis, these advantages must be taken into account. Finally, studies with long-term follow-up are required to show that the risk of CVD is significantly decreased by treating NAFLD.

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