Frequency of Nonalcoholic Fatty Liver Disease and Degree of Hepatic Steatosis in African-American Patients

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Background: This retrospective study evaluates the degree and distribution of hepatic steatosis in predominantly African-American patients who had liver biopsies over a period of five years in our institution.

Method: A search in the pathology registry of Howard University Hospital was performed for the presence of fat in liver biopsies. Each biopsy was assessed.

Results: Of the 320 liver biopsies that were reviewed, 61 were found to have steatosis. Fifty-six of the 61 patients were African-American. The mean body mass index in those African-American patients was found to be 30. Grade-1 steatosis was found in 16 patients, grade 2 in 22 patients, grade 3 in 14 patients and nine patients had grade-4 steatosis. Four patients fulfilled the criteria for the diagnosis of nonalcoholic fatty liver disease (NAFLD). All four patients had simple steatosis without any inflammation. The frequency of NAFLD in our study population was found to be <2%. Nonalcoholic steatohepatitis was not found in any of our study population. Dyslipidemia was found in all four patients with steatosis.

Conclusion: NAFLD has a low prevalence in African-American patients. Nonalcoholic steatohepatitis was not found in any of the African-American patients seen at our institution.

Key words: fatty liver disease ■ nonalcoholic fatty liver disease ■ nonalcoholic steatohepatitis

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BACKGROUND

Hepatic steatosis is associated with several disease conditions. In addition to viral hepatitis, alcoholic and nonalcoholic fatty liver disease (NAFLD) are the main causes. The presence of fat has prognostic and therapeutic value in those disease conditions. In hepatitis C, for example, it has been shown that patients that have associated steatosis hold poor prognosis and rapid progression of fibrosis.[1,2] The degree of hepatic steatosis in the donor liver during transplantation has also been determined to affect the outcome significantly.[3]

NAFLD is an entity that is defined by the presence of fat in the liver parenchyma in the absence of significant alcohol use. It connotes a wide spectrum of disease from simple presence of fat in the liver to associated inflammation [nonalcoholic steatohepatitis (NASH)] and fibrosis. NAFLD has actually been shown to be one of the etiologies in those patients with cryptogenic cirrhosis. It is also known that it can lead to the development of hepatocellular carcinoma.[4-7]

Several studies have hypothesized the "two-hit" theory in that an insulin-resistant state coupled with oxidative stress leads to NASH.[8] This entity is common in patients with the metabolic syndrome—dyslipidemia, central obesity, elevated blood pressure and glucose intolerance.[9] The ethnic groups that are mostly affected by NAFLD are Hispanics and whites. There are few studies that have indicated NAFLD is less common in the African-American population.[10]

The risk factors associated with fatty liver disease and NASH are prevalent in African-American patients, and the incidence continues to rise with the current epidemic of obesity in this country. Despite those facts, the prevalence of NAFLD in the African-American population is reportedly lower than that of other ethnic groups.[10,11]

We set out to evaluate the frequency, degree and distribution of hepatic steatosis in predominantly African-American patients who had liver biopsies over a period of five years in our institution.

PATIENTS AND METHODS

After the study was reviewed and approved by Howard University's institutional review board, a search in the pathology registry was made for liver biopsy specimens containing any degree of fat obtained from

1999–2003.

Biopsies were obtained by percutaneous or transjugular approach. A biopsy specimen was determined to be adequate if ≥6 portal spaces were visualized.

Patient records, imaging studies and laboratory tests were retrospectively analyzed. An expert pathologist assessed each biopsy. The severity of steatosis (macrovesicular steatosis) was graded based on the percent of hepatocytes demonstrating fat in the biopsy as follows: grade 1: <5%, grade 2: 5–33 %, grade 3: 33–66%, grade 4: >66%. Steatohepatitis (necroinflammatory activity and stage of fibrosis) was assessed by using guidelines by Brunt et al.[12]

Fisher's exact test and ANOVA were used to compare the means of alanine aminotransferase (ALT), aspartate aminotransferase (AST), body mass index (BMI), hepatitis-C status, diabetes, platelet count and international normalized ratio (INR) among the four groups.

RESULTS

There were 320 liver biopsies that were reviewed. A total of 61 biopsies were found to have steatosis. The mean age in our study was 49 years, and 55% of the patients were male. African-American patients comprised 94% of the 320 patients with available liver biopsy specimens and 92% (56/61) of the patients with steatosis on their biopsy specimen. The mean BMI in those African-American patients was found to be 30. Hepatitis C associated with abnormal liver function test was the indication for liver biopsy in 42/61 (69%) patients with steatosis on their biopsy specimens. The indication for liver biopsy for the remaining 14 patients was abnormal liver function test, liver mass in two and positive hepatitis B serology in three. Baseline characteristics are summarized in Table 1.

Grade-1 steatosis was found in 16 patients, grade 2 in 22 patients, grade 3 in 14 patients and nine patients had grade-4 steatosis. Alcoholic steatohepatitis was present in two (4%) patients. The degrees of fat infiltration in the two patients with alcoholic steatohepatitis were 50% and 80%.

The mean values of AST, ALT, INR, platelet count and BMI were compared among the four groups by using ANOVA test (Table 2). There was no statistically significant difference when those variables were compared by the degree of steatosis.

Four patients fulfilled the criteria for the diagnosis of NAFLD (no history of alcohol use and had negative work-up for causes of abnormal liver function test). All four patients had simple steatosis without any inflammation. The frequency of NAFLD in our study population was found to be <2%. NASH was not found in any of our study subjects. Dyslipidemia was found in all four patients with steatosis. Two of the patients were diabetic. The degrees of fat distribution in those patients with NAFLD were 25%, 50%, 60% and 90%, respectively. All the patients with NAFLD had metabolic syndrome.

DISCUSSION

In African-American patients, the rate of obesity is increasing at a high rate. From the National Center for Health Statistics data, 50% of African-American women are obese and >60% of African-American adult men are overweight.[13] With this epidemic of obesity, the impact on liver disease, especially in the African-American population, needs to be assessed.

In our study, the prevalence of NAFLD is shown to be less than the prevalence in other ethnic groups. Also, there were no patients that were found to have NASH. The reason for the lower frequency of NAFLD could be because of the fact that the majority of patients had other causes of hepatic steatosis such as ETOH use and

Table 1. Characteristic features of patients with hepatic steatosis

	Grade 1	Grade 2	Grade 3	Grade 4	P Value
Mean age (years)	43.7	47.5	48.6	50.1	0.48
Sex (males/females)	10/6	11/11	8/6	5/4	0.80
Hepatitis C	12	17	9	4	0.15

Table 2. Laboratory features of patients with differing degrees of hepatic steatosis

Laboratory Parameters	Grade of Hepatic Steatosis				
(Mean)	Grade 1	Grade 2	Grade 3	Grade 4	P Value
AST	66.4	86.7	110.2	49	0.69
ALT	63	57.8	66.8	34	0.77
Platelet	227	176.5	264.5	280	0.19
INR	1.4	1.4	1.2	2.1	0.14
BMI	27.5	31.1	26.9	32.7	0.28

Normal reference values; AST: aspartate aminotransferase, (0–50 IU/LT), ALT: alanine aminotransferase, (0–55 IU/LT); platelet (150,000–450,000/μL); international normalized ratio; BMI: body weight (kg) ÷ height (in meters) squared

hepatitis C. The presence of these conditions excludes patients from being diagnosed with NAFLD.

In this retrospective analysis, it is difficult to diagnose patients with coexistent NAFLD and hepatitis C. Though genotype of hepatitis C was not available, there was no statistically significant difference in the frequency of hepatitis-C infection among the different groups of patients with differing degree of steatosis.[14]

Metabolic syndrome remains to be associated with NAFLD in African-American patients, though most black patients with metabolic syndrome were not found to have significant steatosis. We believe that NASH is truly an uncommon entity since our results were not subject to referral or selection bias. Our hospital gives service to a predominantly African-American population of whom the majority are not referred for specialty care. Also, our hospital does not provide liver transplants, which makes a referral bias less likely.

The limitation of our study is that it was performed retrospectively and, as mentioned earlier, it would be difficult to diagnose coexistent hepatitis C and NAFLD. Also, hepatitis-C genotype was not performed since genotype 3 is associated with significant hepatic steatosis.

The prevalence of NAFLD and its associated complications (NASH and cirrhosis) is increasing worldwide and is expected to more than double by the year 2025.[15] Understanding the mechanisms responsible for the ethnic differences in the prevalence of hepatic steatosis and steatosis-related liver injury may provide clues to the development of new therapeutic approaches for the prevention and treatment of this disorder.

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