



Nonalcoholic fatty liver disease in patients with acute ischemic stroke is associated with more severe stroke and worse outcome

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KEYWORDS:

Nonalcoholic fatty liver disease;
Acute ischemic stroke;
Outcome;
Aminotransferases;
Cardiovascular risks

BACKGROUND: There is a paucity of data regarding the association between nonalcoholic fatty liver disease (NAFLD) and acute ischemic stroke. Stroke is largely preventable, so that knowledge of risk factors is essential to achieve reductions in the stroke rate and resulting disease burden.

OBJECTIVE: The aim of the present study was to evaluate the prognostic value of NAFLD on stroke severity and outcome.

METHODS: We prospectively studied 200 patients who were admitted with acute ischemic stroke between September 2013 and August 2015. Demographic and vascular risk factors were detailed for all subjects. The severity of stroke was assessed with National Institutes of Health Stroke Scale score at admission. NAFLD was defined as serum alanine aminotransferase and/or aspartate aminotransferase levels above the upper limit of normal in the absence of other causes of elevated aminotransferase levels. The outcome was assessed with the modified Rankin scale score at discharge.

RESULTS: NAFLD was found in 42.5% of the study population. The prevalence of diabetes was significantly higher among patients with NAFLD than those without NAFLD ($P = .001$). Waist circumference was significantly higher among patients with NAFLD than those without NAFLD ($P < .05$). Patients with NAFLD had significantly higher glucose, Triglycerides, Low density lipoprotein, serum alanine aminotransferase and aspartate aminotransferase than those without NAFLD ($P < .05$ for each comparison). National Institutes of Health Stroke Scale score at admission and modified Rankin scale score at discharge were significantly higher in patients with NAFLD than those without NAFLD ($P < .05$ for each comparison).

CONCLUSION: NAFLD was found in 42.5% of acute ischemic stroke patients. NAFLD might be associated with more severe stroke and worse outcome.

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Conflicts of interest: The authors declare that they do not have any conflict of interest.

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Introduction

Stroke is a common neurologic disorder, the second commonest overall cause of death, and a major cause of disability in survivors. Cerebrovascular disease is globally the sixth commonest cause of an ongoing disease burden, but is expected to move to the fourth place by 2020.¹ More than 65% of stroke deaths are reported from developing countries.² Stroke is largely preventable, so that knowledge of risk factors is essential to achieve reductions in the stroke rate and resulting disease burden.³

Nonalcoholic fatty liver disease (NAFLD) frequency ranges from 9% to 36.9% of the population in different parts of world.⁴ NAFLD is a cause of fatty liver, occurring when fat is deposited (steatosis) within the hepatocytes in people with no history of excessive alcohol consumption.⁵ The best diagnostic test for confirming NAFLD is liver biopsy, but except in patients with progressive fatty liver diseases, its use has been limited because of medical and ethical considerations.⁶ Elevated levels of liver enzymes, such as aspartate aminotransferase (AST) and alanine aminotransferase (ALT), are common laboratory abnormalities found in patients with NAFLD, but the specificity of these tests is low.⁷ Consequently, the clinical evaluation of NAFLD is commonly based on a combination of ultrasonographic findings and laboratory tests.⁸

Studies in the general population suggested that patients with NAFLD have increased risk for stroke.^{9,10} A recent case-control study in 103 patients with ischemic stroke and 200 controls also showed that elevated aminotransferase levels are associated with increased risk for ischemic stroke.¹¹ Also, a previous systemic review showed that NAFLD is strongly associated with carotid atherosclerosis.¹² However, there is a paucity of data regarding the association between NAFLD and the severity and outcome of acute ischemic stroke.

The aim of the present study was to determine the frequency of NAFLD in patients admitted with acute ischemic stroke and to evaluate the prognostic value of NAFLD on stroke severity and outcome.

Patients and methods

We prospectively studied 242 patients who were admitted in Neurology Departments, Zagazig University

Hospital, Saudi German Hospital, and Tanta University Hospital with acute ischemic stroke between September 2013 and August 2015. A written consent was taken from all participants in this research, and the study was approved by Ethical Committee of the Faculty of Medicine, Tanta University.

Patients with chronic hepatitis B and C were serologically excluded. Patients with history of alcohol consumption more than 20 g/d and chronic hepatotoxic drug users were also excluded.

All the patients underwent

- proper history taking: demographic data (age and sex), history of cardiovascular risk factors (hypertension, diabetes mellitus [DM], atrial fibrillation, smoking, alcohol consumption, and family history of premature cardiovascular disease [CVD]), history of concomitant CVD (coronary heart disease [CHD], previous stroke and congestive heart failure), and pharmacologic treatment were recorded.
- proper general and neurologic examination including anthropometric parameters (weight, height, waist circumference, and body mass index) and systolic and diastolic blood pressure were also measured. The severity of stroke was assessed with the National Institutes of Health Stroke Scale (NIHSS) score at admission.

The NIHSS is a 15-item scale, which provides a measure of acute stroke-related impairments by assigning numerical values to various aspects of neurologic function. This score incorporates assessment of language, motor function, sensory loss, consciousness, visual fields, extraocular movements, coordination, neglect, and speech. It is scored from 0 (no impairment) to a maximum of 42. Scores of ≥ 21 are usually described as "severe."¹³

The NIHSS has many advantages as a stroke outcome assessment tool. It is relatively easy and straightforward and takes around 6 minutes to perform. In the acute stroke environment, the NIHSS is well suited to serial measures of impairment. It has been stated that a change in the NIHSS of more than 2 points is relevant indication of early improvement or deterioration.¹⁴

- Routine laboratory investigations were performed the first day after admission after overnight fasting and included serum levels of glucose, total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density

Table 1 The modified Rankin scale

Grade 0	No symptoms at all
Grade 1	No significant disability despite symptoms; able to carry out all usual duties and activities
Grade 2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
Grade 3	Moderate disability; requiring some help, but able to walk without assistance
Grade 4	Moderately severe disability; unable to walk without assistance, unable to attend to needs without assistance
Grade 5	Severe disability; bedridden, incontinent, and requiring constant nursing care and attention
Grade 6	Dead

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