

# Epidemiology of Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis in the United States and the Rest of the World



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## KEYWORDS

• Epidemiology • NAFLD • NASH • Prevalence

## KEY POINTS

- Nonalcoholic fatty liver disease (NAFLD) and its progressive form, nonalcoholic steatohepatitis (NASH), are common causes of chronic liver disease with an increasing worldwide prevalence.
- Because of the differences in diagnostic modalities, prevalence estimates of NAFLD/NASH differ widely across populations.
- Although histologic evaluation with liver biopsy is the gold standard for diagnosing NASH, emerging noninvasive modalities, such as transient elastography, are increasingly used for evaluation of fibrosis in patients with NASH.
- The population studied and their associated risk factors are potential reasons for the variances in prevalence rates.
- As the rate of obesity, diabetes, and metabolic syndrome continue to increase, NAFLD and NASH will bring a tremendous impact on health care in the upcoming years.

## BACKGROUND

Nonalcoholic fatty liver disease (NAFLD) is one of the most common causes of chronic liver disease in adults.<sup>1</sup> NAFLD is a spectrum of liver disease ranging from simple steatosis to steatohepatitis, fibrosis, and cirrhosis.<sup>2</sup> Although not all patients with NAFLD

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develop liver-related complications, patients with nonalcoholic steatohepatitis (NASH) are at an increased risk of developing fibrosis, cirrhosis, or hepatocellular carcinoma.<sup>3</sup> NASH is currently the second indication for liver transplantation and will become the leading indication for liver transplantation in the next two decades.<sup>4</sup> Known risk factors for NAFLD and NASH include metabolic conditions, such as diabetes and obesity, and age, gender, and race/ethnicity.<sup>5</sup> Although the prevalence of NAFLD is well described in the Western World, the global epidemiology of NAFLD is less well described.

In this study, we reviewed the literature (2000-2015) to assess epidemiology of NAFLD in adults. Incidence, prevalence and risk factors were summarized.

### **NONALCOHOLIC FATTY LIVER DISEASE/NONALCOHOLIC STEATOHEPATITIS DIAGNOSIS**

There are several diagnostic modalities used in the diagnosis of NAFLD and NASH. The accuracy of these modalities can vary, which can impact the assessment of epidemiology of NAFLD. For more information on this topic please see [Kleiner DE and Makhlof HR: Histology of Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis in Adults and Children](#), in this issue.

### **NONALCOHOLIC FATTY LIVER DISEASE/NONALCOHOLIC STEATOHEPATITIS INCIDENCE**

There is a paucity of data regarding the incidence of NAFLD. In the literature, the numbers differ widely, and the incidence rates are most likely underreported. In a Japanese study, Sung and colleagues<sup>6</sup> followed up nearly 11,500 patients for 5 years to determine if a change in fatty liver status had an effect on incident hypertension. Fatty liver status was assessed at baseline and in the follow-up period by using ultrasound. In this study, 10% of participants developed fatty liver in 5 years and in 5% of the cohort, fatty liver at baseline resolved during follow-up. In another study from Israel, Zelber-Sagi and coworkers<sup>7</sup> in a 7-year prospective study evaluated the incidence and remission of NAFLD. Their incidence rate was found to be 19%, almost double compared with the study by Sung and colleagues.<sup>6</sup>

In another Japanese study with a longer follow-up period, data from atomic bomb survivors were used. In this study, 1635 patients without NAFLD were followed for 11.6 years. The incidence of NAFLD was found to be 19.9 per 1000 person-years.<sup>8</sup> In a recent study of Wong and colleagues<sup>9</sup> 565 patients were followed. The development of fatty liver was assessed by using MRI and transient elastography. The population incidence of NAFLD at 3 to 5 years was 13.5% (34 per 1000 person-years). The obvious variations in these incidence rates suggest that further studies, using consistent diagnostic modalities, are needed to provide a more accurate assessment of the incidence of NAFLD worldwide.

### **NONALCOHOLIC FATTY LIVER DISEASE/NONALCOHOLIC STEATOHEPATITIS WORLDWIDE PREVALENCE BY CONTINENT**

#### ***North America***

Despite the limitation of the diagnostic modalities, it is clear that NAFLD and NASH have reached epidemic proportions in the United States and North America. In one recent study the US population prevalence of NAFLD was estimated using data from the National Health and Nutrition Examination Survey (NHANES) III database ([Fig. 1](#)). Patients were diagnosed with NAFLD if moderate to severe hepatic steatosis was found on the ultrasound in the absence of other causes of liver disease. Furthermore, NAFLD patients with elevated liver enzymes in the presence of diabetes mellitus

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