



Nonalcoholic Fatty Liver Disease in Overweight Primary Care Patients: Comparison of Clinical Diagnosis vs. Fibrosis-4 and Hepatic Steatosis Index Scores

Hill Wang¹, Katelyn Tessier², Piet C. de Groen¹, Jeffrey H. Albrecht¹, Elizabeth Rogers¹, Carolyn Bramante¹, Sayeed Ikramuddin¹, Nirjhar Dutta¹

1. University of Minnesota Medical School, Minneapolis, MN USA
2. Minnesota Masonic Cancer Center, Biostatistics Core

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Introduction

- Nonalcoholic fatty liver disease (NAFLD) is the leading cause of chronic liver disease worldwide and is commonly associated with obesity^{1,2}
- In the US, more than two-thirds of adults are overweight or have obesity²
- The aim of this study was to assess whether early evidence of NAFLD was being appropriately diagnosed in the primary care patient population

Methods

- A retrospective data analysis was performed on overweight (BMI ≥ 23 for Asians³ or ≥ 25 for other races) patients (age ≥ 18) who had established primary care (defined as ≥ 2 visits in primary care) in a large healthcare system in Minneapolis between 2010 to 2019
- Exclusion criteria:
 - Participants aged 17 or younger
 - Those with a diagnosis of alcoholic liver disease, fatty liver disease and/or a diagnosis of Hep B/C
 - Those with iron overload (serum transferrin saturation ≥50%) were excluded
- The clinical diagnosis of NAFLD was based on ICD-9 and -10 codes (571.8, K75.81, K76.0)
- Fibrosis 4 (FIB-4) score ≥ 3.25 was calculated as marker of hepatic fibrosis^{4,5}. FIB4 scores was calculated using age, AST (U/L), ALT (U/L) and platelets (10⁹/L)
- Hepatic steatosis index (HSI) score ≥ 36 was calculated as a marker of fatty liver disease⁶. HSI score was calculated using ALT (U/L), AST (U/L), BMI, type 2 diabetes and gender
- ICD codes were compared to FIB-4 and HSI scores
- Each patient's outcome was defined at several time points: year of first visit and any time before, and every year thereafter (i.e. 2010-2019)

Results

Table 1: Summary of Baseline Demographics/Characteristics

Variable	All Patients Meeting Criteria (N=373,917)
Female, n (%)	195,901 (52.40%)
First visit age, median (range)	45.0 (18.0, 104.0)
First visit BMI, median (range)	29.5 (23.0, 192.6)
Race, n (%)	
White	322,464 (86.24%)
Black	27,257 (7.29%)
Asian	19,224 (5.14%)
Hispanic or Latino	3,718 (1.18%)
American Indian	2,456 (0.66%)
Pacific Islander	526 (0.14%)
More than 1 race	1988 (0.53%)
Income at first visit	
First visit income, median (range)	66,324.0 (8,888.0, 250,001.0)

Table 2: Summary of Outcomes

	Yes	Percent	No	Data Missing	Total (N)
FIB-4 score ≥ 3.25	15,696	6.6	221,093	137,128	373,917
Patients with abnormal FIB-4 score who are diagnosed by ICD code	1,686	10.7	14,010	0	15,696
HSI score ≥ 36	241,357	90.4*	25,543	107,017	373,917
Patients with abnormal HSI score who are diagnosed by ICD code	14,470	6.0	226,887	0	241,357
NAFLD/fatty liver/NASH diagnosis by ICD code	15,324	4.1	358,593	0	373,917
FIB-4 score ≥ 3.25 among patients who are diagnosed with NAFLD/fatty liver/NASH by ICD code	1,686	11.9	12,468	1,170	15,324
HSI score ≥ 36 among patients who are diagnosed with NAFLD/fatty liver/NASH by ICD code	14,470	97.7	346	508	15,324

*HSI scores are relatively skewed as our sample population included only overweight/obese patients.

Discussion

- Hepatic fibrosis and fatty liver disease are underdiagnosed in our healthcare system based on abnormal FIB-4 and HSI scores
- These results are likely generalizable to other healthcare systems in the US
- Given the frequency and reversibility of early NAFLD, primary care providers should utilize a low threshold to screen for fatty liver disease and hepatic fibrosis using simple labs tests (AST, ALT, platelet count)
- Those with abnormal results should pursue intensive lifestyle modification and weight loss treatment, such as referral to dietitians, the use of weight loss medications, bariatric surgery, or in patients at risk for advanced liver disease, GI-Hepatology consultation
- Future research:
 - Explore the rates of diagnosis based off demographic characteristics: race/ethnicity, health insurance status, income, education, etc.
 - Whether underdiagnosis of NAFLD/NASH leads to excess mortality; e.g. the percentage of patients we calculate as having NASH/NAFLD who later have incident cases of major adverse CVD (MI, stroke, PAD) or death
 - Rates of diagnosis of NAFLD/NASH in other health systems
- Limitations:
 - Single center retrospective study
 - Alcohol use history was obtained only from diagnosis of alcoholic liver disease in the chart, rather than from the social history of alcohol use. This likely led to under-estimations of alcoholic liver disease
 - For 110,994 patients, a Fib-4 score could not be calculated due to a lack of required lab values

Acknowledgements / References

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