Nephrotic syndrome is associated with a higher risk for NAFLD: A Population based study

Somtochukwu Onwuzo, Asif Hitawala, Antoine Boustany, Ashraf Almomani, Prabhat Kumar, Eduard Khristopaytis
Cleveland clinic-Fairview Hospital

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a global health concern with a prevalence of about 25% amongst U.S. adults. Its increased prevalence is attributed to increase in patients with obesity-and metabolic syndrome, partly due to similar mechanisms of injury. Several studies have been conducted to identify the causes and risk factors for the development of NAFLD. Nephrotic syndrome is a clinical entity resulting from extensive proteinuria leading to hypoalbuminemia, hyperlipidaemia, Edema, and other complications. Given its association with hyperlipidaemia, there is concern that patients with nephrotic syndrome may be at risk of NAFLD. Our aim is to perform a cross-sectional population-based study to assess the prevalence of NAFLD in patients with nephrotic syndrome and if nephrotic syndrome was a risk factor for NAFLD.

Methods and Materials

A large multi-center database (Explorys Inc., Cleveland, OH, USA) of aggregated electronic health records of 26 different healthcare systems with a total of 360 hospitals and more than 70 million patients across the United States was utilized for this study. A cohort of patients with a diagnosis of "Non-Alcoholic fatty liver disease" using the Systematized Nomenclature of Medicine - Clinical Terms (SNOMED-CT) between 1999-2022 was identified. We excluded all patients with a history of chronic kidney disease due to its association with NAFLD in previous studies.,.

Univariate and multivariate analysis were performed to adjust for multiple factors including age, sex, Caucasian race, nephrotic syndrome, type II diabetes mellitus, hypothyroidism, dyslipidemia, obesity, and metabolic syndrome. Statistical analysis was conducted using R, and for all analyses, a 2-sided p-value of <0.05 was considered statistically significant.

Table 1. Baseline characteristics of study population

Parameters	NAFLD patient (n, % of total)	Non NAFLD patents (n, % of total)
Age	9030 (18.24)	19,519,940 (24.84)
Female	28,800 (58.18)	42,346,370 (53.90)
Caucasian	39,350 (79.49)	40,531,470 (51.59)
Obesity	27,750 (56.06)	4,869,700 (6.19)
Type 2 Diabetes Mellitus	24,740 (49.97)	4,513,130 (5.74)
Metabolic syndrome	3640 (7.35)	205,670 (0.26)
Hyperlipidaemia	33,010 (66.68)	10,134,440 (12.90)
Nephrotic syndrome	70 (0.14)	17,300 (0.02)
Hypothyroidism	11,890 (24.02)	3,466,740 (4.41)
Total	49,500	7,855,8870

Table 2. Multivariate Analysis of NAFLD in the study population.

Parameter	NAFLD OR (95% CI)	P-value
Age	0.76 (0.75-0.77)	0.00
Female	1.04 (1.02-1.06)	0.00
Caucasian	2.00 (1.95-2.04)	0.00
Obesity	5.54 (5.42-5.65)	0.00
Type 2 Diabetes Mellitus	3.87 (3.79-3.95)	0.00
Metabolic syndrome	3.35 (3.23-3.47)	0.00
Hyperlipidemia	3.49 (3.41-3.58)	0.00
Nephrotic syndrome	5.69 (4.94-6.54)	0.00
Hypothyroidism	1.62 (1.58-1.65)	0.00

Results

Among the 78,608,370 individuals screened in this database, there were a total of 49500 with NAFLD with a prevalence rate of 62 per 100,000 and a total of 17,360 with Nephrotic syndrome with a prevalence rate of 22 per 100,000. The baseline characteristics of patients with NAFLD and Nephrotic syndrome is shown in **Tables 1** respectively. In a multivariate analysis, the odds of having NAFLD amongst patients with nephrotic syndrome was 5.65 (95% CI 4.94-6.54). NAFLD patients were also more likely to have type 2 diabetes mellitus (OR 3.87), hypothyroidism (OR 1.62), obesity (OR 5.54), Hyperlipidemia (OR 3.49), and metabolic syndrome (OR 3.35) as well **(Table 2)**.

Conclusions

Patients with Nephrotic syndrome have increased risk of developing NAFLD. The odds remained significant when controlled with other risk factors of NAFLD, suggesting that nephrotic syndrome is an independent risk factor. These patients will benefit from routine surveillance for NAFLD.

Contact

Somtochukwu Onwuzo, MD
Cleveland clinic – Fairview Hospital
Email: onwuzos@ccf.org
Phone: 8325189058

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