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Association of NAFLD with Cardiovascular and Kidney Outcomes in Patients with Chronic Kidney Disease G3-G4: A Nationwide Cohort Study of South Korean Adults

Cheol Ho Park[1], Hyunsun Lim[3], Jae Young Kim[2], Hyung Woo Kim[1], Jung Tak Park[1], Tae-Hyun Yoo[1], Shin-Wook Kang[1], Tae Ik Chang[2], Seung Hyeok Han[1]
[1]Department of Internal Medicine-Nephrology, Severance Hospital, Korea, Republic of
[2]Department of Department of Research and Analysis, National Health Insurance Service Ilsan Hospital, Korea, Republic of
[3]Department of Internal Medicine-Nephrology, National Health Insurance Service Ilsan Hospital, Korea, Republic of

Objectives : NAFLD has emerged as a potential indicator for cardio-metabolic risk. However, clinical implications of NAFLD in patients with chronic kidney disease (CKD) are still elusive. We investigated to explore the association between NAFLD and adverse clinical outcomes among patients with CKD.
Methods : We analyzed 816,857 individuals who underwent National Health Insurance Service health examinations and had an estimated glomerular filtration rate of 15–59 mL/min/1.73 m^2. The main predictor was the fatty liver index (FLI), a surrogate marker for NAFLD. The primary outcome was a composite cardiovascular or kidney events, which were examined combined or separately.
Results : During a median follow-up of 7.7 (IQR, 6.4–9.6) years, the composite outcome events occurred in 74,266 (9.1%) individuals. Among these, there were 55,525 (6.8%) cardiovascular events and 22,961 (2.8%) kidney events, respectively. Compared to FLI of <30, the HRs (95% CIs) for the composite outcome were 1.16 (1.14–1.18) and 1.30 (1.26–1.33) for the FLIs of 30–59 and ≥60, respectively. The corresponding HRs for cardiovascular events were 1.21 (95% CI, 1.18–1.23) and 1.36 (95% CI, 1.31–1.40), respectively. Furthermore, FLIs of 30–59 and ≥60 were associated with an 11% (HR, 1.11; 95% CI, 1.07–1.15) and 24% (HR, 1.24; 95% CI, 1.17–1.30) increased risk of kidney events, respectively.
Conclusions : In this nationwide cohort study, NAFLD was associated with a higher risk of adverse clinical outcomes in individuals with CKD. These findings suggest that NAFLD, as assessed by the FLI, can serve as a predictor of cardiovascular and kidney events in the CKD population.

Figure 1.jpg

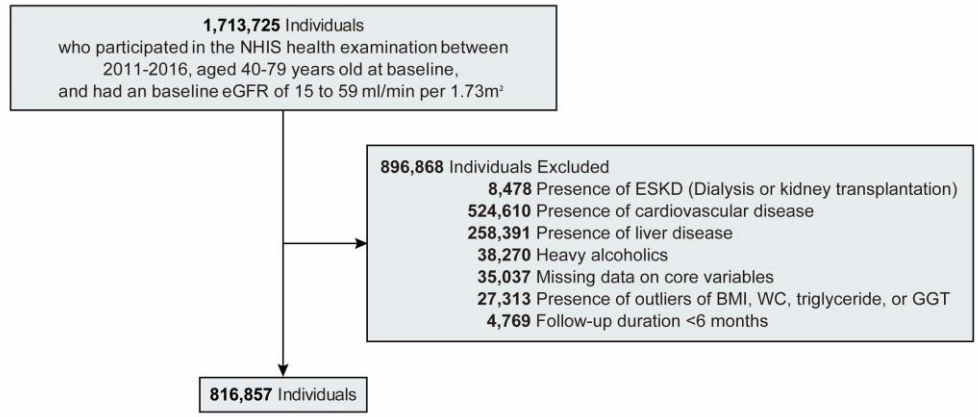

Figure 1.jpg

Fatty liver index	Events No/participants No (%)	Incidence rate per 1,000 PYs	HR (95% CI)	P value
Overall				
<30	11,390 (2.4)/470,449	9.7	1 [Reference]	
30-59	26,319/247,780 (10.6)	13.6	1.16 (1.14-1.18)	<0.001
≥60	11,543/98,628 (11.7)	15.3	1.30 (1.26-1.33)	<0.001
Men				
<30	17,405/149,771 (11.6)	15.1	1 [Reference]	
30-59	15,941/129,939 (12.3)	16.0	1.10 (1.07-1.13)	<0.001
≥60	7,962/64,670 (12.3)	16.2	1.20 (1.16-1.25)	<0.001
Women				
<30	18,999/320,678 (5.9)	7.4	1 [Reference]	
30-59	10,378/117,841 (8.8)	11.1	1.22 (1.18-1.25)	<0.001
≥60	3,581/33,958 (10.6)	13.5	1.45 (1.38-1.52)	<0.001
Diabetes				
<30	13,357/93,400 (14.3)	18.8	1 [Reference]	
30-59	11,338/69,645 (16.3)	21.6	1.15 (1.12-1.19)	<0.001
≥60	5,435/30,837 (17.6)	23.8	1.32 (1.26-1.38)	<0.001
Non-diabetes				
<30	23,047/377,049 (6.1)	7.6	1 [Reference]	
30-59	14,981/178,135 (8.4)	10.6	1.16 (1.13-1.19)	<0.001
≥60	6,108/67,791 (9.0)	11.6	1.29 (1.24-1.34)	<0.001
Statin users				
<30	9,014/87,636 (10.3)	13.5	1 [Reference]	
30-59	7,872/63,245 (12.5)	16.5	1.16 (1.12-1.20)	<0.001
≥60	3,801/27,040 (14.1)	19.0	1.33 (1.26-1.40)	<0.001
Statin non-users				
<30	27,390/382,813 (7.2)	8.9	1 [Reference]	
30-59	18,447/184,535 (10.0)	12.7	1.16 (1.13-1.18)	<0.001
≥60	7,742/71,588 (10.8)	13.9	1.28 (1.24-1.33)	<0.001
BMI <25 kg/m²				
<30	31,359/392,530 (8.0)	10.1	1 [Reference]	
30-59	11,280/90,578 (12.5)	16.1	1.17 (1.14-1.20)	<0.001
≥60	1,356/9,885 (13.7)	17.9	1.23 (1.16-1.30)	<0.001
BMI ≥25 kg/m²				
<30	5,045/77,919 (6.5)	8.1	1 [Reference]	
30-59	15,039/157,202 (9.6)	12.2	1.17 (1.13-1.21)	<0.001
≥60	10,187/88,743 (11.5)	15.0	1.33 (1.28-1.39)	<0.001
eGFR 45-59 ml/min/1.73m²				
<30	27,058/430,765 (6.3)	7.9	1 [Reference]	
30-59	19,951/223,443 (8.9)	11.4	1.19 (1.17-1.22)	<0.001
≥60	8,645/88,205 (9.8)	12.7	1.36 (1.31-1.40)	<0.001
eGFR 15-44 ml/min/1.73m²				
<30	9,346/39,684 (23.6)	31.6	1 [Reference]	
30-59	6,368/24,337 (26.2)	35.6	1.09 (1.05-1.14)	<0.001
≥60	2,898/10,423 (27.8)	38.6	1.18 (1.11-1.25)	<0.001