

Use of Statins for Primary Prevention among Individuals with Chronic Kidney Disease in The United States: A Cross-Sectional, Time-Trend Analysis

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Background: Chronic kidney disease (CKD) populations face an elevated risk of cardiovascular disease (CVD), yet many remain undertreated with statins for primary prevention—to prevent initial CVD onset—despite meeting eligibility criteria.

Objectives: We examined trends in statin use for primary prevention in CKD before and after the 2013 Kidney Disease: Improving Global Outcomes (KDIGO) guideline for specific populations with CKD considering sociodemographic and clinical factors.

Methods: Study

Design: Cross-sectional time-trend analysis

Settings and Participants: We used 2001-2020 National Health and Nutrition Examination Survey (NHANES) data to identify individuals eligible for statin therapy per the 2013 KDIGO guidelines based on: (1) age ≥ 50 without self-reported CVD; (2) CKD, defined as estimated glomerular filtration rate < 60 mL/min/1.73 m² or albumin-to-creatinine ratio ≥ 30 mg/g; and (3) no dialysis in the past 12 months.

Outcome: Statin use

Statistical Analysis: We used Poisson regression to estimate prevalence ratios (PR) after accounting for NHANES' complex survey design and sampling weights.

Results: Among eligible individuals, statin use approximately doubled from 18.6% in 2001-2002 to 36.1% in 2007-2008, increased modestly to 40.1% in the 2013-2014 cycle, then subsequently plateaued. In patients with hypertension, statin use increased from 21.7% in 2001-2002 to 39.5% in 2007-2008, reached a peak of 46.7% in 2011-2012, and plateaued. For those with diabetes, statin use showed the most substantial increase, rising two and half fold from 21.4% in 2001-2002 to 54.8% in 2009-2010 and subsequently plateaued. In contrast, individuals with CKD alone had lower statin use, increasing from 10.3% in 2001-2002 to 21.8% in 2007-2008, reaching its highest level of 26.9% in 2013-2014, before declining to 19.5% in recent years. Multivariable analyses controlling for sociodemographic and clinical characteristics and secular trends demonstrated statin use for primary prevention was higher among those with hypertension (PR 1.49, CI 1.28-1.74) and diabetes (PR 1.71, CI 1.52-1.92), compared with their counterparts.

Conclusions: Despite substantial increase in statin use for primary prevention in CKD before 2013, use has plateaued since the 2013 KDIGO guideline release, although such use remains higher among those with hypertension or diabetes. Our findings highlight the need for improved CVD risk monitoring and appropriate consideration of statin therapy for individuals with CKD.

References and Suggested Readings

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Table 1: Distribution of Characteristics Among Non-CVD CKD Populations Aged ≥ 50 years Stratified by Current Statin Use, NHANES 2001-2020

	Total N=4976 % (95% confidence interval)	Statin Users N=1717 % (95% confidence intervals)	Non-statin Users N=3259 % (95% confidence intervals)
Age (years)			
50-75	67.5 (65.7, 69.4)	62.5 (59.5, 65.6)	70.1 (68.0, 72.2)
>75	32.5 (30.6, 34.3)	37.5 (34.4, 40.5)	29.9 (27.8, 32.0)
Sex			
Male	40.6 (38.7, 42.6)	41.7 (38.3, 45.0)	40.1 (37.7, 42.5)
Female	59.4 (57.4, 61.3)	58.3 (55.0, 61.7)	59.9 (57.5, 62.3)
Race/Ethnicity			
Non-Hispanic Black	14.1 (12.3, 16.0)	14.1 (11.8, 16.4)	14.2 (12.2, 16.2)
Non-Hispanic White	71.2 (68.4, 73.9)	72.4 (69.0, 75.9)	70.5 (67.5, 73.5)
Hispanic	8.6 (7.1, 10.2)	7.7 (6.0, 9.4)	9.1 (7.4, 10.8)
Other	6.1 (5.1, 7.0)	5.8 (4.5, 7.0)	6.2 (5.0, 7.4)
Education			
Less than HS	24.8 (22.9, 26.7)	23.7 (20.8, 26.5)	25.4 (23.3, 27.5)
College+	20.4 (18.2, 22.6)	20.6 (18.0, 23.2)	20.3 (17.5, 23.1)
HS/Some College	54.8 (52.6, 56.9)	55.7 (52.6, 58.9)	54.3 (51.7, 57.0)
Poverty Level*			
≤1	14.7 (13.3, 16.1)	12.1 (10.4, 13.8)	16.0 (14.3, 17.7)
1-2	26.6 (24.8, 28.4)	27 (24.1, 30.0)	26.4 (24.1, 28.6)
> 2	58.7 (56.2, 61.2)	60.8 (57.5, 64.2)	57.6 (54.6, 60.7)
Insured	93.0 (92.1, 93.9)	97.4 (96.3, 98.6)	90.8 (89.5, 92.1)
Smoking			
Current	14.8 (13.5, 16.1)	10.4 (8.2, 12.5)	17.0 (15.3, 18.7)
Former	35.6 (33.8, 37.5)	39.9 (36.8, 43.0)	33.5 (31.4, 35.6)
Never	49.6 (47.7, 51.4)	49.7 (46.6, 52.9)	49.5 (47.3, 51.7)
BMI* (kg/m ²)			
<25	24.7 (22.9, 26.5)	19.3 (16.7, 21.9)	27.5 (25.1, 29.8)
25-30	33.6 (31.8, 35.4)	34.3 (31.4, 37.2)	33.2 (31.0, 35.4)
≥30	41.7 (39.8, 43.7)	46.4 (43.2, 49.6)	39.3 (36.9, 41.7)
Total Cholesterol* (mg/dL)			
<200	53.9 (51.8, 56.0)	78.3 (75.6, 80.9)	41.5 (39.0, 44.0)
200 - 239	28.5 (26.6, 30.3)	16.6 (14.2, 19.0)	34.5 (32.3, 36.8)
≥240	17.6 (16.2, 19.1)	5.2 (3.8, 6.5)	24.0 (21.9, 26.1)
LDL Cholesterol* (mg/dL)			
<100	38.6 (35.3, 41.9)	62.6 (57.9, 67.2)	25.7 (22.1, 29.3)
100 - 129	31.3 (28.3, 34.3)	28.8 (24.5, 33.1)	32.7 (28.9, 36.5)
130 - 159	20.1 (17.7, 22.5)	6.8 (4.5, 9.1)	27.3 (23.9, 30.6)
160 - 189	7.1 (5.6, 8.5)	1.2 (0.4, 1.9)	10.3 (8.2, 12.4)
≥190	2.9 (1.8, 4.0)	0.7 (0.1, 1.3)	4.1 (2.5, 5.7)
Hypertension	71.5 (69.5, 73.4)	81.4 (78.9, 83.9)	66.5 (63.8, 69.1)
Diabetes	32.5 (30.6, 34.5)	45.7 (42.1, 49.3)	25.9 (23.6, 28.1)
eGFR* (mL/min/1.73 m ²)			
≥90	22.1 (20.1, 24.2)	15.7 (13.2, 18.2)	25.4 (22.8, 28.0)
60-90	26 (24.1, 27.8)	24.4 (21.4, 27.5)	26.8 (24.5, 29.0)
30-60	49 (46.9, 51.1)	56.3 (53.0, 59.6)	45.2 (42.8, 47.7)
<30	2.9 (2.3, 3.5)	3.5 (2.6, 4.5)	2.6 (1.9, 3.3)
ACR* (mg/g)			
<30	35.7 (33.6, 37.9)	39.7 (36.8, 42.6)	33.7 (31.1, 36.3)
30-300	55.2 (53.0, 57.3)	50.2 (47.1, 53.2)	57.7 (55.0, 60.4)
≥300	9.1 (8.2, 10.1)	10.1 (8.3, 12.0)	8.6 (7.4, 9.8)

Data are Percentages n (%) (95% CI); * Among participants with measured or reported values

Table 2: Prevalence of Statin Use and Multivariable Prevalence Ratios (PRs) in Non-CVD CKD Populations, NHANES 2001-2020

	Prevalence, % (95% confidence intervals)	Multivariable Prevalence Ratio (95% confidence intervals)	P-value for Association
NHANES Cycles			< 0.001
2001_2002	18.63 (13.50, 23.76)	Referent	
2003_2004	24.92 (20.43, 29.40)	1.27 (0.92, 1.74)	
2005_2006	29.07 (23.56, 34.59)	1.53 (1.09, 2.13)	
2007_2008	36.09 (30.40, 41.79)	1.83 (1.33, 2.52)	
2009_2010	36.66 (32.23, 41.09)	1.77 (1.30, 2.40)	
2011_2012	36.70 (30.77, 42.63)	1.94 (1.40, 2.68)	
2013_2014	40.08 (34.56, 45.59)	2.06 (1.51, 2.81)	
2015_2016	34.24 (29.09, 39.38)	1.73 (1.27, 2.37)	
2017_2020	40.35 (34.55, 46.15)	1.97 (1.44, 2.68)	
Age			0.058
50-75	31.06 (28.83, 33.28)	Referent	
>75	38.71 (35.92, 41.50)	1.11 (1.00, 1.23)	
Gender			0.999
Female	32.95 (30.39, 35.51)	Referent	
Male	34.41 (31.62, 37.20)	1.00 (0.88, 1.13)	
Race/Ethnicity			0.377
Non-Hispanic Black	33.37 (30.13, 36.60)	Referent	
Non-Hispanic White	34.15 (31.71, 36.58)	1.11 (0.99, 1.24)	
Hispanic	30.00 (25.69, 34.31)	1.07 (0.92, 1.23)	
Other	31.85 (26.28, 37.43)	1.07 (0.90, 1.28)	
Education			0.963
Less than HS	32.02 (28.86, 35.17)	Referent	
HS/Some College	34.12 (31.83, 36.41)	1.01 (0.89, 1.15)	
College+	33.84 (29.10, 38.58)	1.02 (0.86, 1.22)	
Poverty Level			0.083
≤1	27.44 (24.59, 30.28)	Referent	
1-2	33.83 (30.46, 37.19)	1.14 (0.99, 1.32)	
> 2	34.49 (31.62, 37.35)	1.18 (1.02, 1.36)	
Missing*	36.62 (30.53, 42.71)	1.28 (1.01, 1.62)	
Insurance			< 0.001
No	12.27 (7.32, 17.22)	Referent	
Yes	35.14 (33.15, 37.14)	2.48 (1.66, 3.69)	
Smoking			0.125
Never	33.64 (31.28, 36.00)	Referent	
Former	37.57 (34.40, 40.74)	1.09 (0.98, 1.20)	
Current	23.51 (19.06, 27.95)	0.91 (0.74, 1.13)	
BMI			0.003
<25	26.52 (22.94, 30.10)	Referent	
≥30	37.75 (35.05, 40.45)	1.19 (1.03, 1.37)	
25-30	34.62 (31.48, 37.76)	1.21 (1.04, 1.40)	
Missing*	20.28 (13.60, 26.96)	0.72 (0.51, 1.02)	
Hypertension			< 0.001
No	21.83 (18.47, 25.19)	Referent	
Yes	38.21 (36.10, 40.33)	1.49 (1.28, 1.74)	
Diabetes			< 0.001
No	26.98 (24.57, 29.39)	Referent	
Yes	47.14 (43.93, 50.36)	1.71 (1.52, 1.92)	
eGFR			0.009
≥90	23.96 (20.36, 27.55)	Referent	
60-90	31.74 (28.10, 35.39)	1.26 (1.04, 1.51)	
30-60	38.81 (36.15, 41.46)	1.45 (1.18, 1.79)	
<30	40.71 (32.41, 49.00)	1.39 (1.07, 1.80)	
Missing*	28.36 (20.63, 36.09)	1.24 (0.93, 1.64)	
ACR			0.918
<30	37.15 (34.11, 40.19)	Referent	
30-300	30.39 (28.18, 32.59)	0.99 (0.85, 1.14)	
≥300	37.12 (30.88, 43.35)	1.05 (0.87, 1.26)	
Missing*	39.63 (28.82, 50.44)	1.03 (0.79, 1.35)	