

Alcohol consumption is inversely associated with stage 3 chronic kidney disease in Taiwanese men

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BACKGROUND

Chronic kidney disease (CKD) is a major global public health burden, but there is limited understanding of the relationship of alcohol consumption with CKD.

METHODS

In this cross-sectional multivariable study, all participants of a health check-up program in Ditmanson Medical Foundation Chia-Yi Christian Hospital in Taiwan from 2003 to 2009 (15 353 women and 11 900 men) were included for analysis. Estimated glomerular filtration rate was used to define CKD stage and history of alcohol consumption was obtained by self-reporting. Multivariable logistic regression analyses of gender-specific association of alcohol drinking with stage 3 CKD were conducted. A trend tests was conducted to check the dose-response relationship of alcohol consumption with renal disease. A sensitivity test was conducted to rule out the likelihood of reverse causality.

RESULTS

The prevalence of stage 3 CKD was lower in drinkers than non-drinkers ($p < 0.001$) and the percentage of drinkers with stage 3 CKD was less than that of non-drinkers. Multivariable analysis indicated that alcohol consumption was negatively associated with the presence of stage 3 CKD in men (adjusted odds ratio [aOR] for occasional drinking: 0.68, 95% CI: 0.59~0.78, $p < 0.001$; aOR for frequent drinking: 0.47, 95% CI: 0.35~0.63, $p < 0.001$). Advanced age, hypertension, anemia, BMI of at least 24, hyperuricemia, and proteinuria were also associated with stage 3 CKD in men. Trend tests indicated lower odds of having stage 3 CKD with increased alcohol consumption in both genders. Subgroup analyses and sensitivity tests also indicated the reverse association between alcohol consumption and stage 3 CKD in men regardless of age, diabetes status, and other risky behaviors.

Table 1 Demographic and clinical characteristics of men with different self-reported drinking histories

Variable	Overall (n = 11900)	Non-drinkers (n = 8015)	Occasional drinkers (n = 3246)	Frequent drinkers (n = 639)	p
Age (years)	58.82 ± 12.04	60.87 ± 12.14	54.55 ± 10.66	54.85 ± 10.54	<0.001
Stage 3 CKD, n (%)	2064(17.3)	1640(20.5)	361(11.1)	63(9.9)	<0.001
eGFR (mL/min/1.73 m ²)	74.41 ± 16.17	72.85 ± 16.24	77.38 ± 15.41	78.90 ± 16.07	<0.001
Creatinine (mg/dL)	1.13 ± 0.22	1.14 ± 0.23	1.10 ± 0.19	1.08 ± 0.19	<0.001
Hypertension, n (%)	5372(45.1)	3703(46.2)	1355(41.7)	314(49.1)	<0.001
Systolic BP (mmHg)	133.01 ± 19.56	133.19 ± 19.78	132.08 ± 19.02	135.52 ± 19.25	<0.001
Diastolic BP (mmHg)	79.26 ± 12.25	78.55 ± 12.13	80.25 ± 12.34	83.09 ± 12.37	<0.001
Hyperlipidemia, n (%)	432(3.6)	287(3.6)	124(3.8)	21(3.3)	0.739
Cholesterol (mg/dL)	206.68 ± 41.30	205.62 ± 40.15	209.54 ± 43.17	205.49 ± 45.06	<0.001
Triglyceride (mg/dL)	156.70 ± 166.51	143.66 ± 115.73	173.54 ± 228.20	234.76 ± 272.61	<0.001
Hyperuricemia, n (%)	4629(38.9)	2997(37.4)	1334(41.1)	298(46.6)	<0.001
Uric acid (mg/dL)	6.75 ± 1.62	6.69 ± 1.64	6.83 ± 1.52	7.02 ± 1.72	<0.001
Diabetes, n (%)	1767(14.8)	1233(15.4)	415(12.8)	119(18.6)	<0.001
Fasting blood glucose (mg/dL)	107.03 ± 40.24	106.86 ± 39.70	106.60 ± 40.65	111.37 ± 44.42	0.019
Liver dysfunction, n (%)	2480(20.8)	1581(19.7)	732(22.6)	167(26.1)	<0.001
ALT (IU/L)	37.14 ± 42.86	36.28 ± 44.58	38.32 ± 37.89	41.97 ± 44.22	0.001
Anemia, n (%)	719(6.0)	582(7.3)	109(3.4)	28(4.4)	<0.001
Hemoglobin (g/dL)	15.19 ± 1.44	15.06 ± 1.45	15.43 ± 1.32	15.55 ± 1.54	<0.001
WBC count (10 ³ /μL)	6.51 ± 1.99	6.47 ± 1.95	6.57 ± 1.82	6.79 ± 3.01	<0.001
Proteinuria, n (%)	1310(11.0)	910(11.4)	308(9.5)	92(14.4)	<0.001
BMI (kg/m ²)	25.11 ± 3.47	24.94 ± 3.48	25.50 ± 3.34	25.29 ± 3.76	<0.001
Smoking, n (%)	3024(25.4)	1425(17.8)	1192(36.7)	407(63.7)	<0.001
Betel nut chewing, n (%)	1538(12.9)	484(6.0)	760(23.4)	294(46.0)	<0.001

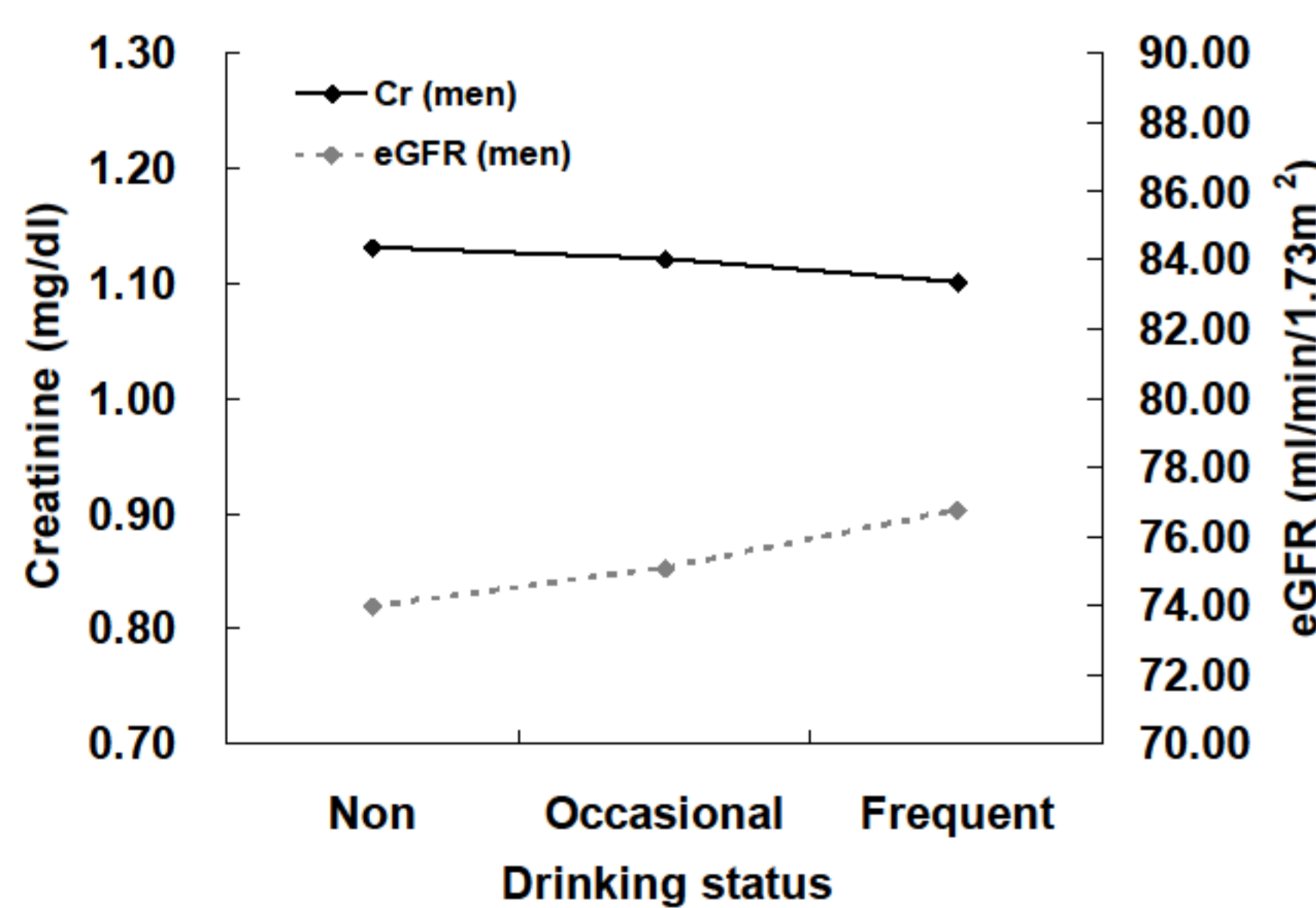


Figure 1 Age-adjusted means of serum creatinine (Cr) and estimated glomerular filtration rate (eGFR) in men in different alcohol drinking status.

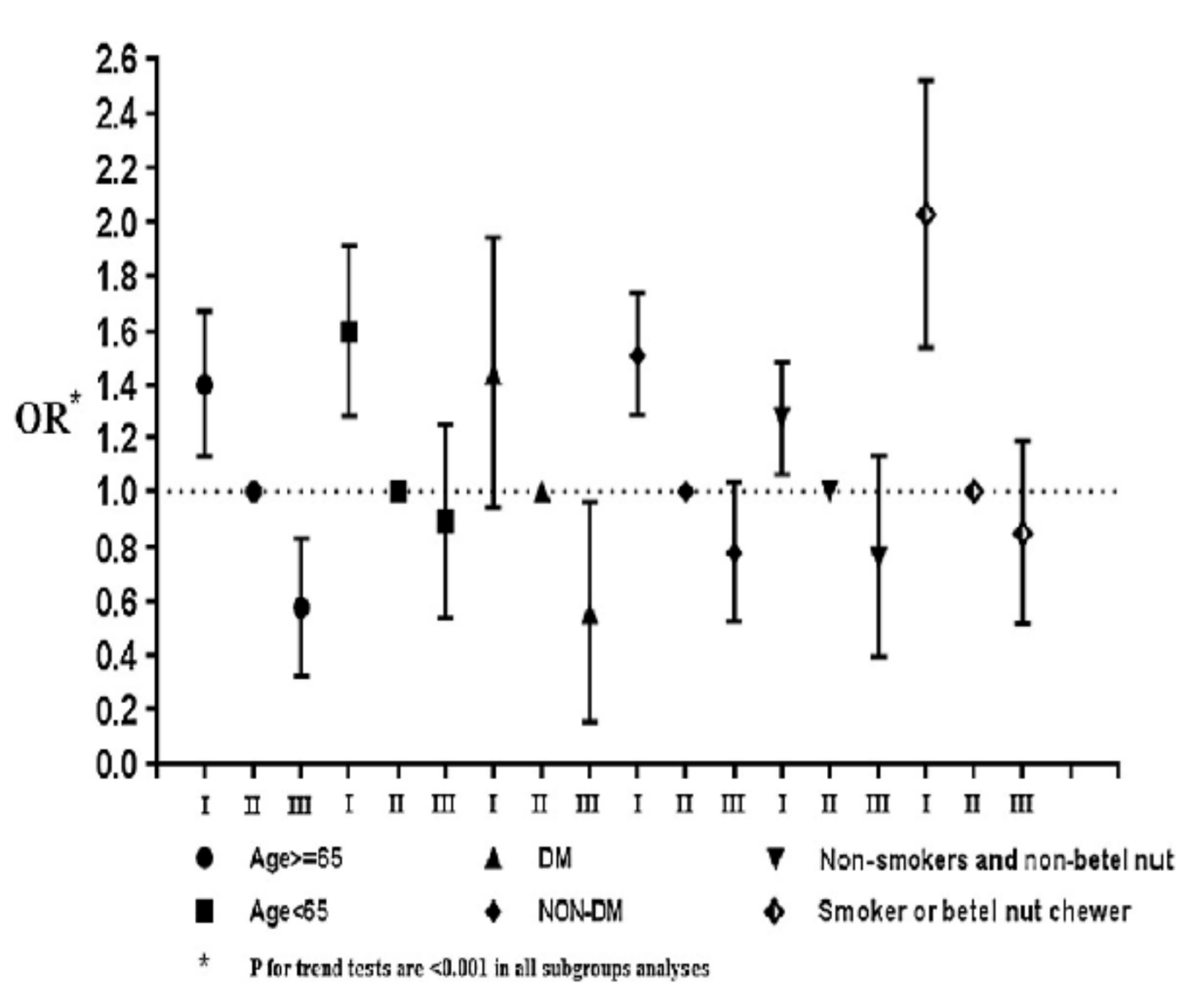


Figure 2 Analysis of CKD risk in men who were non-drinkers (I), occasional drinkers (II), and frequent drinkers (III), as the reference group) with respect to age, presence of diabetes, and tobacco and betel nut usage. The analysis was adjusted for age, smoking, betel nut chewing, hypertension, diabetes, anemia, hyperlipidemia, body mass index, hyperuricemia, and proteinuria.

Table 2 Multivariate logistic regression analysis of the association of alcohol consumption with chronic kidney disease in men based on three models

Variable (N=11,900)	Model 1		Model 2		Model 3	
	Multivariable OR (95% CI)	p	Multivariable OR (95% CI)	p	Multivariable OR (95% CI)	p
Age ≥ 65 years	5.53(4.97-6.15)	<0.001	5.54(4.97-6.17)	<0.001	5.07(4.52-5.70)	<0.001
Smoking			0.95(0.83-1.09)	0.460	1.02(0.89-1.18)	0.769
Betel nut chewing			1.09(0.91-1.32)	0.347	1.12(0.92-1.36)	0.268
Hypertension					1.63(1.46-1.82)	<0.001
Diabetes					1.04(0.90-1.21)	0.560
Anemia					2.14(1.78-2.57)	<0.001
Hyperlipidemia					1.17(0.90-1.53)	0.232
BMI 18.5-24/ BMI < 18.5					1.32(0.91-1.91)	0.146
BMI ≥ 24/ BMI < 18.5					1.49(1.02-2.15)	0.037
Hyperuricemia					3.19(2.86-3.56)	<0.001
Proteinuria					2.26(1.96-2.62)	<0.001
Occasional drinking/Non-drinking	0.73(0.64-0.83)	<0.001	0.72(0.63-0.83)	<0.001	0.68(0.59-0.78)	<0.001
Frequent drinking/Non-drinking	0.61(0.46-0.81)	0.001	0.61(0.46-0.81)	0.001	0.47(0.35-0.63)	<0.001
	<i>P for trend</i>	<i><0.001</i>	<i>P for trend</i>	<i><0.001</i>	<i>P for trend</i>	<i><0.001</i>
Non/Occasional drinking	1.37(1.21-1.56)	<0.001	1.38(1.21-1.58)	<0.001	1.48(1.29-1.7)	<0.001
Frequent/Occasional drinking	0.84(0.63-1.12)	0.241	0.84(0.62-1.12)	0.235	0.69(0.51-0.94)	0.020
	<i>P for trend</i>	<i><0.001</i>	<i>P for trend</i>	<i><0.001</i>	<i>P for trend</i>	<i><0.001</i>

*Model 1 was adjusted for age alone; Model 2 was adjusted for age plus smoking and betel nut chewing; Model 3 was adjusted for all variables in Model 2 plus hypertension, diabetes, anemia, hyperlipidemia, body mass index, hyperuricemia, and proteinuria.

CONCLUSIONS

Alcohol consumption was inversely associated with stage 3 CKD in Taiwanese men. However, considering the potential of other health damage with alcohol consumption, the current results should be interpreted cautiously.