

Supplementary Materials: Associations of serum betaine with blood pressure and hypertension incidence in middle-aged and older adults: a prospective cohort study

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Supplemental Table 1. Baseline characteristics of hypertensive and nonhypertensive participants

□ Variables	Hypertensive (n=657)	Nonhypertensive (n=1339)	P-value
Serum betaine, μmol/L	49.9 (39.8-60.8)	51.9 (42.5-61.9)	0.013
Age, years	58.4 (5.0)	56.4 (4.6)	<0.001
Women, n (%)	440 (67.0)	987 (73.7)	0.002
Education attainment, n (%)			<0.001
≤9 years	221 (33.6)	346 (25.8)	
9-12 years	273 (41.6)	687 (51.3)	
≥12 years	163 (24.8)	306 (22.9)	
Household income, n (%)			0.237
≤1500 Yuan/Month/Person	211 (32.1)	475 (35.5)	
1501-3000 Yuan/Month/Person	312 (47.5)	623 (46.5)	
>3000 Yuan/Month/Person	134 (20.4)	241 (18.0)	
Smoker, n (%)	98 (14.9)	179 (13.4)	0.384
Alcohol drinker, n (%)	40 (6.1)	66 (4.9)	0.328
Total energy intake, kcal/d	1813 (512)	1810 (492)	0.905
Chinese Healthy Eating Index	71.1 (7.6)	71.4 (8.1)	0.323
Physical activity, MET-h/d	42.8 (16.1)	43.0 (15.8)	0.836
Waist circumference, cm	85.1 (8.5)	81.0 (8.6)	<0.001
Serum metabolites			
TG, mmol/L	1.45 (1.04-2.07)	1.20 (0.85-1.71)	<0.001
TC, mmol/L	5.48 (1.01)	5.42 (1.05)	0.302
HDL-C, mmol/L	1.31 (0.31)	1.41 (0.33)	<0.001
LDL-C, mmol/L	3.69 (0.89)	3.60 (0.89)	0.025
Choline, μmol/L	20.1 (14.8-26.2)	18.9 (13.8-25.3)	0.023
Homocysteine, μmol/L	13.5 (11.6-17.3)	12.8 (11.0-16.0)	<0.001
Abdominal obesity, n (%)	282 (42.9)	372 (27.8)	<0.001
Prediabetes or diabetes, n (%)	90 (13.7)	73 (5.5)	<0.001
Antihypertension medication use, n (%)	311 (47.3)	0 (0.0)	<0.001
SBP, mmHg	139.5 (15.8)	115.4 (11.3)	<0.001
DBP, mmHg	85.9 (10.0)	73.4 (7.5)	<0.001
Pulse pressure, mmHg	53.6 (13.2)	42.0 (8.4)	<0.001

Data were presented as mean (standard deviation) or median (interquartile range) for continuous variables; and frequency (percentage) for categorical variables.

Abbreviations: MET, metabolic equivalent of task; TG, triglycerides; TC, total cholesterol; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; SBP, systolic blood pressure; DBP, diastolic blood pressure.

Supplemental Table 2. Stratified HRs and 95% CIs for incident hypertension according to baseline serum betaine levels (quartiles)

□	N	Sex-Specific Quartiles of Serum Betaine Levels				P-interaction ^a
		Q1	Q2	Q3	Q4	
Age, years						0.999
≤55.5	669	Ref.	0.84 (0.53, 1.33)	0.78 (0.49, 1.25)	1.01 (0.65, 1.56)	
>55.5	670	Ref.	0.83 (0.58, 1.20)	0.75 (0.51, 1.08)	0.93 (0.64, 1.36)	
Sex						0.873
men	352	Ref.	0.79 (0.48, 1.30)	0.84 (0.51, 1.38)	1.05 (0.63, 1.75)	
women	987	Ref.	0.78 (0.55, 1.11)	0.72 (0.50, 1.03)	0.86 (0.61, 1.22)	
Smoker						0.359
no	1160	Ref.	0.80 (0.59, 1.09)	0.74 (0.54, 1.02)	0.84 (0.62, 1.15)	
yes	179	Ref.	0.74 (0.34, 1.61)	0.79 (0.36, 1.74)	1.51 (0.70, 3.26)	
Alcohol drinker						0.791
no	1273	Ref.	0.82 (0.61, 1.10)	0.75 (0.56, 1.01)	0.94 (0.70, 1.26)	
yes	66	Ref.	0.30 (0.05, 1.76)	0.65 (0.15, 2.84)	0.40 (0.08, 1.98)	
CHEI						0.772
≤72.0	670	Ref.	0.74 (0.48, 1.12)	0.82 (0.55, 1.23)	0.98 (0.66, 1.48)	
>72.0	669	Ref.	0.83 (0.56, 1.22)	0.68 (0.45, 1.03)	0.90 (0.60, 1.35)	
Abdominal obesity						0.217
no	967	Ref.	0.76 (0.53, 1.09)	0.61 (0.42, 0.90)	0.78 (0.55, 1.12)	
yes	372	Ref.	0.85 (0.53, 1.37)	1.01 (0.64, 1.59)	1.22 (0.76, 1.96)	
TG, mmol/L						0.244
<1.7	996	Ref.	0.66 (0.46, 0.95)	0.75 (0.53, 1.07)	0.91 (0.65, 1.30)	
≥1.7	343	Ref.	1.12 (0.70, 1.78)	0.76 (0.45, 1.31)	0.94 (0.56, 1.58)	
HDL-C, mmol/L						0.557
<1.0	115	Ref.	0.65 (0.23, 1.87)	0.24 (0.09, 0.65)	2.07 (0.73, 5.82)	
≥1.0	1224	Ref.	0.82 (0.61, 1.11)	0.78 (0.57, 1.06)	0.92 (0.68, 1.25)	
Prediabetes or diabetes						0.306
no	1266	Ref.	0.84 (0.63, 1.13)	0.80 (0.59, 1.08)	0.95 (0.70, 1.28)	
yes	73	Ref.	0.19 (0.04, 0.81)	0.20 (0.05, 0.86)	0.56 (0.13, 2.35)	
Serum choline, μmol/L						0.173
≤18.9	670	Ref.	0.95 (0.64, 1.42)	0.93 (0.62, 1.37)	0.83 (0.54, 1.27)	
>18.9	669	Ref.	0.67 (0.45, 1.01)	0.59 (0.38, 0.92)	0.99 (0.67, 1.46)	

^a Interactions between serum betaine and covariates were tested by the likelihood ratio test using the multiplicative interaction term. In the multivariable-adjusted model, confounding factors including age, education attainment, household income, smoker, alcohol drinker, energy intake, CHEI, physical activity, WC, TG, HDL-C, prediabetes or diabetes (yes or no), and serum choline. The medians of age, CHEI, and serum choline were cut-off points.