



Figure S1 Subgroup analyses for the potential modifiers of the association between ratio of serum albumin to globulin and all-cause mortality in participants with kidney stones. The model was adjusted for sex, age, race and ethnicity, education, SBP, hypertension, diabetes, congestive heart failure, coronary heart disease, malignancy, BMI, TC, TG, BUN, UA, HbA1c, WBC, eGFR, MCHC, AST, and GGT. AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; CI, confidence interval; eGFR, estimated glomerular filtration rate; GGT, gamma-glutamyltransferase; HbA1c, glycated hemoglobin A1c; HR, hazard ratio; MCHC, mean cell hemoglobin concentration; Q, quartile; ref, reference; SBP, systolic blood pressure; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell count.

Table S1 Baseline characteristics of participants stratified by the ratio of serum albumin to globulin

Variables	Overall (n=31,091)	Quartiles for the ratio of serum albumin to globulin				P value
		Q1 (n=7,773)	Q2 (n=7,773)	Q3 (n=7,772)	Q4 (n=7,773)	
Kidney stones	2,955 (9.5)	770 (9.9)	723 (9.3)	733 (9.4)	729 (9.4)	0.57
Ratio of serum albumin to globulin	1.48±0.30	1.13±0.13	1.37±0.05	1.56±0.06	1.86±0.21	<0.001
Age (years)	49.8±17.7	51.7±17.3	50.4±17.3	49.1±17.7	48.0±18.2	<0.001
Male	15,068 (48.5)	2,721 (35.0)	3,442 (44.3)	4,092 (52.7)	4,813 (61.9)	<0.001
BMI (kg/m ²)	29.3±7.0	31.9±8.4	29.7±6.7	28.3±6.0	27.0±5.3	<0.001
Ethnicity						<0.001
Mexican American	4,747 (15.3)	1,325 (17.0)	1,358 (17.5)	1,216 (15.6)	848 (10.9)	
Other Hispanic	3,281 (10.6)	906 (11.7)	883 (11.4)	848 (10.9)	644 (8.3)	
Non-Hispanic White	12,849 (41.3)	1,915 (24.6)	2,784 (35.8)	3,490 (44.9)	4,660 (60.0)	
Non-Hispanic Black	6,403 (20.6)	2,711 (34.9)	1,773 (22.8)	1,208 (15.5)	711 (9.1)	
Other race	3,811 (12.3)	916 (11.8)	975 (12.5)	1,010 (13.0)	910 (11.7)	0.75
Education						<0.001
Less than high school	23,416 (75.3)	5,389 (69.3)	5,688 (73.2)	5,960 (76.7)	6,379 (72.1)	
High school grade or equivalent	24,015 (77.2)	5,986 (77.0)	6,006 (77.3)	5,945 (76.5)	6,078 (78.2)	
Some college or above	14,751 (47.4)	4,171 (53.7)	3,852 (49.6)	3,639 (46.8)	3,089 (39.7)	
SBP (mmHg)	124.2±18.3	127.2±20.1	124.3±18.2	123.2±17.7	122.3±16.9	<0.001
DBP (mmHg)	70.2±12.6	70.7±13.8	70.5±12.4	70.2±12.2	69.5±11.9	<0.001
Hypertension	11,276 (36.3)	3,459 (44.5)	2,931 (37.7)	2,544 (32.7)	2,342 (30.1)	<0.001
Diabetes	4,121 (13.3)	1,496 (19.2)	1,102 (14.2)	855 (11.0)	668 (8.6)	<0.001
Congestive heart failure	1,025 (3.3)	403 (5.2)	259 (3.3)	196 (2.5)	167 (2.1)	<0.001
Coronary heart disease	1,276 (4.1)	353 (4.5)	329 (4.2)	278 (3.6)	316 (4.1)	0.02
Malignancy	2,932 (9.4)	694 (8.9)	680 (8.7)	722 (9.3)	836 (10.8)	<0.001
TG (mmol/L)	1.4 (0.9, 2.1)	1.4 (1.0, 2.0)	1.4 (0.9, 2.1)	1.4 (0.9, 2.1)	1.3 (0.9, 2.1)	0.002
TC (mmol/L)	4.9 (4.2, 5.6)	4.9 (4.2, 5.6)	5.0 (4.3, 5.7)	4.9 (4.2, 5.7)	4.9 (4.2, 5.6)	<0.001
HDL-C (mmol/L)	1.3 (1.1, 1.6)	1.3 (1.1, 1.6)	1.3 (1.1, 1.6)	1.3 (1.1, 1.6)	1.3 (1.1, 1.6)	<0.001
BUN (mmol/L)	4.6 (3.6, 5.7)	4.3 (3.2, 5.7)	4.6 (3.6, 5.7)	4.6 (3.6, 5.7)	4.6 (3.9, 5.7)	<0.001
UA (mg/dL)	5.5±1.5	5.5±1.6	5.4±1.5	5.4±1.4	5.42±1.4	<0.001
HbA1c (%)	5.8±1.1	6.1±1.4	5.8±1.1	5.7±0.9	5.5±0.8	<0.001
WBC (×10 ⁹ /L)	6.9 (5.7, 8.4)	7.2 (5.9, 8.8)	7.0 (5.8, 8.4)	6.9 (5.7, 8.3)	6.7 (5.6, 8.0)	<0.001
MCHC (g/L)	33.9±1.1	33.6±1.1	33.8±1.0	34.0±1.0	34.1±1.1	<0.001
eGFR (mL/min/1.73 m ²)	97.3 (80.4, 111.5)	96.2 (75.6, 111.4)	97.2 (80.2, 111.6)	98.1 (82.2, 111.7)	97.7 (83.0, 111.3)	<0.001
Albumin (g/L)	42.2±3.5	39.0±3.2	41.6±2.5	43.2±2.4	45.0±2.7	<0.001
Globulin (g/L)	29.4±4.6	34.9±3.9	30.3±2.0	27.8±1.7	24.4±2.3	<0.001
ALT (U/L)	20.0 (16.0, 28.0)	19.0 (14.0, 27.0)	20.0 (16.0, 27.0)	21.0 (16.0, 29.0)	21.0 (17.0, 28.0)	<0.001
AST (U/L)	23.0 (19.0, 27.0)	22.0 (18.0, 27.0)	22.0 (19.0, 27.0)	23.0 (19.0, 27.0)	23.0 (20.0, 27.0)	<0.001
GGT (U/L)	20.0 (14.0, 31.0)	22.0 (15.0, 35.0)	21.0 (15.0, 31.0)	20.0 (14.0, 29.0)	19.0 (14.0, 27.0)	<0.001

Data are presented as mean ± SD, n (%), or median (25th percentile, 75th percentile). ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; DBP, diastolic blood pressure; eGFR, estimated glomerular filtration rate; GGT, gamma-glutamyltransferase; HbA1c, glycated hemoglobin A1c; HDL-C, high-density lipoprotein cholesterol; MCHC, mean cell hemoglobin concentration; Q, quartile; SBP, systolic blood pressure; SD, standard deviation; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell count.

Table S2 Baseline characteristics of participants with kidney stones stratified by survival status

Variables	Overall (n=2,955)	All-cause death		P value
		No (n=2,565)	Yes (n=390)	
Ratio of serum albumin to globulin	1.47±0.29	1.48±0.29	1.39±0.31	<0.001
Age (years)	56.1±16.2	53.8±15.6	71.2±11.0	<0.001
Male	1,304 (44.1)	1,186 (46.2)	118 (30.3)	<0.001
BMI (kg/m ²)	30.5±7.0	30.6±7.0	29.8±6.4	0.03
Ethnicity				<0.001
Mexican American	388 (13.1)	355 (13.8)	33 (8.5)	
Other Hispanic	328 (11.1)	298 (11.6)	30 (7.7)	
Non-Hispanic White	1,604 (54.3)	1,333 (52.0)	271 (69.5)	
Non-Hispanic Black	378 (12.8)	342 (13.3)	36 (9.2)	
Other race	257 (8.7)	237 (9.2)	20 (5.1)	
Education				<0.001
Less than high school	750 (25.4)	626 (24.4)	124 (31.8)	
High school grade or equivalent	671 (22.7)	561 (21.9)	110 (28.2)	
Some college or above	1,534 (51.9)	1,378 (53.7)	156 (40.0)	
SBP (mmHg)	126.9±18.7	125.8±17.9	134.1±22.4	<0.001
DBP (mmHg)	70.6±12.9	71.3±12.6	66.0±14.2	<0.001
Hypertension	1,500 (50.8)	1,229 (47.9)	271 (69.5)	<0.001
Diabetes	670 (22.7)	521 (20.3)	149 (38.2)	<0.001
Congestive heart failure	190 (6.4)	112 (4.4)	78 (20.0)	<0.001
Coronary heart disease	241 (8.2)	154 (6.0)	87 (22.3)	<0.001
Malignancy	447 (15.1)	342 (13.3)	105 (26.9)	<0.001
TG (mmol/L)	1.5 (1.0, 2.3)	1.5 (1.0, 2.3)	1.6 (1.0, 2.3)	0.67
TC (mmol/L)	4.9 (4.2, 5.6)	4.9 (4.2, 5.6)	4.5 (3.7, 5.2)	<0.001
HDL-C (mmol/L)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	0.02
BUN (mmol/L)	5.0 (3.9, 6.4)	5.0 (3.9, 6.1)	6.4 (4.6, 8.2)	<0.001
UA (mg/dL)	5.6±1.5	5.6±1.5	6.1±1.8	<0.001
HbA1c (%)	6.0±1.2	6.0±1.2	6.4±1.4	<0.001
WBC (×10 ⁹ /L)	7.1 (5.9, 8.5)	7.1 (5.9, 8.5)	7.1 (5.7, 8.5)	0.74
MCHC (g/L)	33.9±1.1	33.9±1.1	34.0±1.0	0.045
eGFR (mL/min/1.73 m ²)	90.7 (73.3, 105.5)	94.0 (77.1, 107.2)	69.6 (55.3, 87.2)	<0.001
Albumin (g/L)	41.7±3.4	41.9±3.3	40.4±3.9	<0.001
Globulin (g/L)	29.2±4.6	29.0±4.4	30.2±5.9	<0.001
ALT (U/L)	21.0 (16.0, 28.0)	21.0 (16.0, 29.0)	19.0 (15.0, 26.0)	<0.001
AST (U/L)	23.0 (19.0, 28.0)	23.0 (19.0, 28.0)	24.0 (20.0, 30.0)	<0.001
GGT (U/L)	21.0 (15.0, 33.0)	21.0 (15.0, 32.0)	22.0 (16.0, 38.8)	0.044

Data are presented as mean ± SD, n (%), or median (25th percentile, 75th percentile). ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; DBP, diastolic blood pressure; eGFR, estimated glomerular filtration rate; GGT, gamma-glutamyltransferase; HbA1c, glycated hemoglobin A1c; HDL-C, high-density lipoprotein cholesterol; MCHC, mean cell hemoglobin concentration; SBP, systolic blood pressure; SD, standard deviation; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell count.

Table S3 Sensitivity analysis: the association between the ratio of serum albumin to globulin and risk of all-cause mortality in participants with kidney stones

Ratio of serum albumin to globulin	Total, n	No. of events (%)	Model 1		Model 2		Model 3	
			HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Sensitivity analysis 1: exclusion of participants with malignancy								
Category								
Q1 (<1.28)	623	95 (15.2)	Ref.		Ref.		Ref.	
Q2–3 (1.28 to <1.66)	1,274	136 (10.7)	0.61 (0.47, 0.80)	<0.001	0.67 (0.51, 0.88)	0.005	0.74 (0.56, 0.99)	0.04
Q4 (\geq 1.66)	611	54 (8.8)	0.51 (0.36, 0.71)	<0.001	0.59 (0.42, 0.84)	0.003	0.68 (0.47, 0.99)	0.04
P for trend				<0.001		0.002		0.002
Sensitivity analysis 2: exclusion of participants with follow-up period <1 year								
Category								
Q1 (<1.28)	719	112 (15.6)	Ref.		Ref.		Ref.	
Q2–3 (1.28 to <1.66)	1,464	171 (11.7)	0.63 (0.49, 0.80)	<0.001	0.68 (0.53, 0.87)	0.002	0.73 (0.56, 0.94)	0.02
Q4 (\geq 1.66)	733	68 (9.3)	0.48 (0.35, 0.65)	<0.001	0.56 (0.41, 0.77)	0.001	0.61 (0.44, 0.85)	0.004
P for trend				<0.001		<0.001		0.003

Model 1: adjustments for sex, age, and race and ethnicity. Model 2: Model 1 + further adjustments for education, SBP, hypertension, diabetes, congestive heart failure, coronary heart disease, and malignancy. Model 3 (full model): Model 2 + further adjustments for BMI, TC, TG, BUN, UA, HbA1c, WBC, eGFR, MCHC, AST, and GGT. AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; CI, confidence interval; eGFR, estimated glomerular filtration rate; GGT, gamma-glutamyltransferase; HbA1c, glycated hemoglobin A1c; HR, hazard ratio; MCHC, mean cell hemoglobin concentration; Q, quartile; ref., reference; SBP, systolic blood pressure; SD, standard deviation; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell count.

Table S4 Additional analysis: the association between the ratio of serum albumin to globulin and risk of specific mortality in participants with kidney stones

Ratio of serum albumin to globulin	Total, n	No. of events (%)	Model 1		Model 2		Model 3	
			HR (95% CI)	P value	HR (95% CI)	P value	HR (95% CI)	P value
Additional analysis 1: CV mortality								
Category								
Q1 (<1.28)	739	33 (4.5)	Ref.		Ref.		Ref.	
Q2–3 (1.28 to <1.66)	1,477	53 (3.6)	0.68 (0.44, 1.07)	0.10	0.74 (0.47, 1.15)	0.18	0.97 (0.60, 1.57)	0.91
Q4 (\geq 1.66)	739	22 (3.0)	0.54 (0.31, 0.95)	0.03	0.66 (0.38, 1.17)	0.16	0.89 (0.49, 1.63)	0.71
P for trend				0.03		0.15		0.56
Additional analysis 2: cancer mortality								
Category								
Q1 (<1.28)	739	25 (3.4)	Ref.		Ref.		Ref.	
Q2–3 (1.28 to <1.66)	1,477	43 (2.9)	0.70 (0.42, 1.16)	0.17	0.73 (0.44, 1.21)	0.22	0.80 (0.47, 1.35)	0.41
Q4 (\geq 1.66)	739	15 (2.0)	0.47 (0.24, 0.90)	0.02	0.47 (0.24, 0.91)	0.03	0.52 (0.26, 1.04)	0.06
P for trend				0.02		0.02		0.06
Additional analysis 3: non-CV/cancer mortality								
Category								
Q1 (<1.28)	739	74 (10.0)	Ref.		Ref.		Ref.	
Q2–3 (1.28 to <1.66)	1,477	88 (6.0)	0.49 (0.36, 0.68)	<0.001	0.53 (0.39, 0.73)	<0.001	0.58 (0.42, 0.82)	0.002
Q4 (\geq 1.66)	739	37 (5.0)	0.40 (0.26, 0.60)	<0.001	0.48 (0.32, 0.73)	0.001	0.54 (0.35, 0.84)	0.006
P for trend				<0.001		<0.001		0.003

Model 1: adjustments for sex, age, and race and ethnicity. Model 2: Model 1 + further adjustments for education, SBP, hypertension, diabetes, congestive heart failure, coronary heart disease, and malignancy. Model 3 (full model): Model 2 + further adjustments for BMI, TC, TG, BUN, UA, HbA1c, WBC, eGFR, MCHC, AST, and GGT. AST, aspartate aminotransferase; BMI, body mass index; BUN, blood urea nitrogen; CI, confidence interval; CV, cardiovascular; eGFR, estimated glomerular filtration rate; GGT, gamma-glutamyltransferase; HbA1c, glycated hemoglobin A1c; HR, hazard ratio; MCHC, mean cell hemoglobin concentration; Q, quartile; ref., reference; SBP, systolic blood pressure; SD, standard deviation; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell count.