

Supplementary materials

The association between asymptomatic hyperuricemia and risk of arthritis, findings from a US National Survey 2007-2018

Supplementary Tables

sTable1. Characteristics of participants included in this study

sTable2. Subgroup analysis of the association of arthritis subtype (RA, OA, Other and Unspecified) and AH.

Supplementary Table 1. Characteristics of participants included in this study

	2007-2008	2009-2010	2011-2012	2013-2014	2015-2016	2017-2018	p
N*	2330	2528	2229	2367	2067	2126	
Uricacid							0.438
NA	83.65(81.60,85.69)	84.50(82.38,86.62)	84.71(82.87,86.64)	83.55(81.95,85.15)	84.13(82.09,86.17)	83.61(80.70,86.53)	
AH	16.35(14.01,18.40)	15.50(13.38,17.62)	15.29(13.46,17.13)	16.45(14.85,18.05)	15.87(13.83,17.91)	16.39(13.47,19.30)	
Gender							0.279
Male	47.25(45.60,48.89)	45.56(43.56,47.55)	47.90(45.04,50.75)	47.69(45.61,49.77)	47.36(45.31,49.42)	48.09(44.95,51.22)	
Female	52.75(51.11,54.40)	54.44(52.45,56.44)	52.10(49.25,54.96)	52.31(50.23,54.39)	52.64(50.58,54.69)	51.91(48.78,55.05)	
Age							<0.01
20-29	19.13(16.42,21.85)	19.35(16.80,21.90)	18.23(15.01,21.45)	18.40(15.73,21.08)	16.67(14.61,18.72)	19.86(16.81,22.90)	
30-39	18.20(15.96,20.43)	16.98(14.62,19.35)	18.53(15.67,21.39)	17.24(15.16,19.31)	15.59(14.04,17.15)	18.76(15.92,21.60)	
40-49	20.97(17.50,24.44)	21.50(19.52,23.49)	18.86(15.20,22.52)	19.43(16.80,22.07)	18.56(15.67,21.45)	15.71(13.13,18.28)	
50-59	19.29(16.77,21.80)	19.37(16.98,21.77)	19.08(17.07,21.08)	18.17(15.58,20.76)	18.81(17.09,20.54)	19.93(16.84,23.02)	
60-69	11.44(9.42,13.46)	11.18(9.90,12.46)	14.03(12.10,15.96)	14.71(12.03,17.38)	19.21(16.43,22.00)	14.81(11.45,18.16)	
70+	10.98(9.65,12.30)	11.60(10.10,13.10)	11.26(9.65,12.88)	12.05(10.37,13.73)	11.16(9.36,12.96)	10.95(8.93,12.97)	
Race/Ethnicity							<0.01
Other Race	13.87(10.43,17.31)	16.55(11.72,21.38)	15.80(11.44,20.16)	16.88(12.75,21.02)	17.24(13.58,20.90)	19.91(16.40,23.42)	
Hispanic	5.09(2.60,7.58)	5.84(2.94,8.74)	6.74(3.84,9.64)	5.67(2.34,8.61)	6.74(3.88,9.59)	6.86(5.00,8.72)	
Non-Hispanic White	70.37(63.63,77.11)	66.91(60.23,73.59)	68.04(61.22,74.87)	67.07(60.01,74.13)	65.74(57.81,73.66)	61.96(57.22,66.69)	

Non-Hispanic Black	10.67(6.63,14.70)	10.70(8.67,12.72)	9.42(5.94,12.90)	10.37(7.68,13.07)	10.29(5.86,14.71)	11.27(7.61,14.93)	
Education Level							<0.01
High school or below	43.02(37.88,48.16)	41.31(37.13,45.52)	37.42(31.97,42.87)	36.42(30.79,42.04)	36.46(30.23,42.68)	39.61(36.03,43.19)	
Some college	28.45(26.32,30.58)	29.63(26.71,32.56)	31.10(27.90,34.30)	32.90(29.91,35.90)	31.18(27.20,35.16)	29.91(25.07,34.76)	
College graduate or above	28.53(24.06,33.00)	29.05(25.76,32.33)	31.48(25.02,37.94)	30.68(26.29,35.07)	32.36(25.35,39.37)	30.47(24.72,36.23)	
BMI							<0.01
Normal	33.39(31.60,35.19)	32.13(28.74,35.52)	31.68(27.63,35.73)	31.24(28.78,33.70)	27.17(23.38,30.96)	29.29(25.52,33.05)	
Overweight	35.11(32.97,37.26)	32.96(30.44,35.48)	33.36(31.12,35.60)	33.31(30.91,35.70)	32.66(31.03,34.28)	31.53(29.18,33.8)	
Obesity	31.49(28.61,34.37)	34.91(32.02,37.79)	34.96(31.50,38.42)	35.45(33.20,37.70)	40.17(36.34,44.00)	39.18(35.37,43.00)	
Blood pressure							<0.01
Hypertension	40.92(37.47,44.37)	40.38(36.47,44.30)	45.82(41.97,49.68)	43.84(39.24,48.43)	44.44(40.49,48.40)	46.99(43.71,50.28)	
Normal	59.08(55.63,62.53)	59.62(55.70,63.53)	54.18(50.32,58.03)	56.16(51.57,60.76)	55.56(51.60,59.51)	53.01(49.72,56.29)	
PIR							<0.01
Low income	19.38(16.16,22.61)	21.90(19.24,24.56)	24.29(20.21,28.38)	25.33(19.07,31.59)	19.64(16.45,22.82)	20.01(17.46,22.56)	
Middle income	33.99(30.47,37.52)	37.50(33.75,41.26)	35.70(31.24,40.17)	33.69(30.70,36.68)	37.50(34.14,40.87)	37.61(33.36,41.86)	
High income	46.62(41.80,51.44)	40.60(36.83,44.36)	40.00(33.29,46.72)	40.98(34.20,47.76)	42.86(37.83,47.88)	42.38(37.89,46.88)	
Smoking							0.01
Current	21.61(18.39,24.83)	18.98(17.51,20.45)	20.06(16.75,23.36)	19.50(15.86,23.14)	18.73(15.50,21.97)	17.47(14.68,20.27)	
Before	24.99(22.25,27.73)	24.21(20.55,27.87)	23.04(20.16,25.92)	23.68(20.64,26.72)	26.46(22.62,30.31)	24.90(22.47,27.32)	
Never	53.40(49.73,57.07)	56.80(53.00,60.61)	56.90(53.76,60.05)	56.82(52.86,60.78)	54.81(50.57,59.04)	57.63(54.64,60.62)	

PAL								<0.01
Moderate activities	58.98(55.40,62.57)	62.32(59.17,65.48)	61.71(57.96,65.46)	62.05(59.40,64.70)	57.56(54.23,60.90)	52.20(49.94,54.47)		
Vigorous activities	41.02(37.43,44.60)	37.68(34.52,40.83)	38.29(34.54,42.04)	37.95(35.30,40.60)	42.44(39.10,45.77)	47.80(45.53,50.06)		
Diabetes								<0.01
Yes	10.17(8.32,12.03)	9.47(8.21,10.74)	10.20(8.31,12.09)	10.34(8.83,11.84)	12.25(9.95,14.55)	12.14(9.78,14.49)		
No	89.83(87.97,91.68)	90.53(89.26,91.79)	89.80(87.91,91.69)	89.66(88.16,91.17)	87.75(85.45,90.05)	87.86(85.51,90.22)		
With or without arthritis								<0.01
No arthritis	74.05(70.64,77.47)	74.90(72.43,77.38)	77.19(73.85,80.53)	75.09(72.40,77.78)	73.16(70.09,76.24)	74.47(70.56,78.38)		
Arthritis	25.95(22.53,29.36)	25.10(22.62,27.57)	22.81(19.47,26.15)	24.91(22.22,27.60)	26.84(23.76,29.91)	25.53(21.62,29.44)		
OA	8.70(6.56,10.85)	9.56(8.30,10.82)	11.30(8.92,13.68)	13.88(11.87,15.89)	12.92(10.99,14.86)	12.44(9.32,15.55)		
RA	3.57(2.87,4.27)	4.11(3.18,5.04)	3.90(2.78,5.02)	3.09(2.15,4.02)	3.59(2.53,4.64)	4.04(2.82,5.25)		
Other	3.54(2.56,4.52)	3.64(2.80,4.47)	2.88(1.39,4.37)	2.98(2.05,3.91)	3.33(1.66,5.01)	3.04(1.78,4.30)		
Unspecified	10.13(8.22,12.05)	7.79(6.41,9.17)	4.73(3.14,6.33)	4.96(4.03,5.89)	6.99(5.25,8.73)	6.02(4.66,7.37)		
Cholesterol(mg/dl)†	194.90±40.98	195.00±39.66	191.78±39.95	188.44±39.94	190.31±41.06	186.04±40.55		<0.01
LDL(mg/dl)†	115.60±35.83	116.32±34.82	114.41±34.74	111.74±35.10	112.89±35.82	110.72±35.69		<0.01
HDL(mg/dl)†	54.15±15.40	54.40±15.95	53.78±14.93	54.58±16.11	55.97±17.56	54.02±15.74		<0.01
Triglyceride(mg/dl)†	125.72±66.36	121.43±64.17	117.95±64.42	110.61±65.08	107.26±63.05	106.48±63.30		<0.01
Creatinine(mg/dl)†	123.56±74.93	124.01±74.60	125.83±78.25	119.58±74.02	126.23±77.54	136.33±83.94		<0.01
Albumin(mg/dl)†	58.18±663.81	33.09±182.80	37.78±211.82	40.30±250.06	51.49±338.92	56.01±379.49		0.105

*N represents unweighted number, and the remaining values are weighted values using NHANES MEC examination weight.

†Figures are expressed as mean ± standard error, other figures are expressed as percent (95% confidence intervals).

BMI: body mass index; PIR: poverty income ratio; PAL: Physical activity level; LDL: Low-density lipoprotein; HDL: High-density lipoprotein; RA: Rheumatoid arthritis; OA: Osteoarthritis; AH: asymptomatic hyperuricemia (serum urate > 6.8 mg/dL with no gout); NA: no-hyperuricemia.

Supplementary Table 2. Subgroup analysis of the association of arthritis subtype (RA, OA, Other and Unspecified) and AH

	OA (OR,95%, P)	RA (OR,95%, P)	Other (OR,95%, P)	Unspecified (OR,95%, P)
Gender				
Male	1	1	1	1
Female	1.35(1.14,1.60)0.00	1.08(0.83,1.41)0.59	1.00(0.78,1.29)1.00	0.99(0.82,1.20)0.96
Age				
20-29	1	1	1	1
30-39	0.36(0.27,0.49)0.00	0.36(0.24,0.54)0.00	0.35(0.23,0.55)0.00	0.38(0.27,0.53)0.00
40-49	0.80(0.62,1.04)0.97	0.99(0.71,1.38)0.96	0.88(0.64,1.21)0.44	0.95(0.70,1.30)0.74
50-59	2.16(1.72,2.72)0.00	2.12(1.50,3.00)0.000	1.35(1.00,1.83)0.51	1.90(1.44,2.49)0.00
60-69	4.18(3.26,5.35)0.00	3.34(2.50,4.46)0.000	1.69(1.13,2.53)0.01	2.70(1.92,3.78)0.00
70+	5.50(4.18,7.22)0.00	4.57(3.40,6.15)0.000	1.51(0.99,2.33)0.06	4.24(3.16,5.69)0.00

RA: rheumatoid arthritis; OA: osteoarthritis; AH: asymptomatic hyperuricemia

All data were adjusted for gender, age, race, BMI, education level and poverty to income ratio, hypertension, ever cigarette smoking and diabetes.