**Table 1. Association between Hyperuricemia and Components of Metabolic Syndrome in Men and Women, NHANES 1999-2020\***

|  |  |  |
| --- | --- | --- |
|  | **Fully adjusted Odds ratio (95% CI) †** | |
| **Men**  N=10,103 | **Women**  N=8,901 |
| **Normal**  **↑Waist circumference** | 1.00 (Reference) | 1.00 (Reference) |
| 2.52 (2.18, 2.92) | 3.18 (2.63, 3.83) |
| **Normal**  **↑Triglycerides** | 1.00 (Reference) | 1.00 (Reference) |
| 1.46 (1.22, 1.76) | 1.27 (1.05, 1.54) |
| **Normal**  **↓HDL Cholesterol** | 1.00 (Reference) | 1.00 (Reference) |
| 0.96 (081, 1.15) | 1.37 (1.12, 1.68) |
| **Normal**  **↑Blood pressure** | 1.00 (Reference) | 1.00 (Reference) |
| 1.63 (1.39, 1.92) | 2.21 (1.82, 1.79) |
| **Normal**  **↑Fasting glucose** | 1.00 (Reference) | 1.00 (Reference) |
| 1.05 (0.90, 1.22) | 1.54 (1.32, 1.79) |
| **Normal**  **Metabolic syndrome‡** | 1.00 (Reference) | 1.00 (Reference) |
| 2.73 (2.32, 3.20) | 3.98 (3.38, 4.69) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

† Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise. eGFR and all the other components of metabolic syndrome.

‡ Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise and eGFR.

Hyperuricemia was defined as a serum urate level of > 7.0mg/dL in males, and > 5.7mg/dL in females

**Table 2. Association between Hyperuricemia and Components of Metabolic Syndrome according to Ethnicity, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Fully adjusted Odds ratio (95% CI)** **†** | | | | |
| **White**  N=7,976 | **Black**  N=3,449 | **Hispanic**  N=4,359 | **Other**  N=1,436 | **Asian**  N=796 |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Waist circumference** | 2.72 (2.31, 3.20) | 2.68 (2.14, 3.38) | 2.46 (1.91, 3.17) | 1.78 (1.23, 2.57) | 2.15 (1.44, 3.20) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Triglycerides** | 1.34 (1.13, 1.59) | 1.40 (1.06, 1.85) | 1.68 (1.26, 2.24) | 1.81 (1.17, 2.80) | 0.97 (0.59, 1.58) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↓HDL Cholesterol** | 1.11 (0.92, 1.33) | 0.98 (0.76, 1.28) | 1.09 (0.86, 1.40) | 1.19 (0.80, 1.77) | 1.62 (0.99, 2.64) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Blood pressure** | 1.99 (1.65, 2.40) | 1.68 (1.32, 2.12) | 1.80 (1.34, 2.40) | 1.52 (1.07, 2.16) | 1.22 (0.84, 1.77) |
| **Normal**  **↑Fasting glucose** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 1.30 (1.12, 1.50) | 1.33 (1.10, 1.60) | 1.22 (0.97, 1.53) | 1.43 (0.98, 2.08) | 1.32 (0.83, 2.11) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **Metabolic syndrome‡** | 3.41 (2.94, 3.95) | 2.47 (2.02, 3.04) | 3.23 (2.57, 4.05) | 3.09 (2.12, 4.51) | 2.04 (1.28, 3.25) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Asian: NHANES 2011–2020,

† Adjusted for sex, age, education level, smoking status, alcohol intake, regular exercise. eGFR and all the other components of metabolic syndrome.

‡ Adjusted for sex, age, education level, smoking status, alcohol intake, regular exercise and eGFR.

**Table 3. Association between Hyperuricemia and Components of Metabolic Syndrome according to Cycle, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Fully adjusted Odds ratio (95% CI)** **†** | | | | |
| **1999-2002**  N=3,369 | **2003-2006**  N=3,233 | **2007-2010**  N=4,039 | **2011-2014**  N=3,639 | **2015-2020**  N=4,724 |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Waist circumference** | 2.80 (2.23, 3.50) | 3.07 (2.36, 3.99) | 2.75 (2.06, 3.67) | 2.47 (1.84, 3.30) | 2.42 (1.89, 3.09) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Triglycerides** | 1.34 (1.03, 1.76) | 1.72 (1.41, 2.10) | 1.26 (0.98, 1.63) | 1.62 (1.18, 2.22) | 1.36 (0.96, 1.92) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↓HDL Cholesterol** | 1.43 (1.00, 1.76) | 0.95 (0.71, 1.27) | 1.05 (0.79, 1.40) | 0.97 (0.71, 1.32) | 1.08 (0.80, 1.45) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Blood pressure** | 1.89 (1.34, 2.68) | 1.87 (1.28, 2.72) | 1.65 (1.28, 2.14) | 1.93 (1.46, 2.55) | 2.25 (1.45, 3.11) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **↑Fasting glucose** | 1.13 (0.92, 1.39) | 1.45 (1.10, 1.90) | 1.28 (0.97, 0.99) | 1.33 (1.05, 1.69) | 1.31 (1.09, 1.57) |
| **Normal** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| **Metabolic syndrome‡** | 3.37 (2.72, 4.17) | 3.27 (2.43, 4.39) | 2.85 (2.08, 3.89) | 3.31 (2.58, 4.26) | 3.58 (2.92, 4.38) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

† Adjusted for sex, age, ethnicity, education level, smoking status, alcohol intake, regular exercise. eGFR and all the other components of metabolic syndrome.

‡ Adjusted for sex, age, ethnicity, education level, smoking status, alcohol intake, regular exercise and eGFR.

**Table 4. Association between Gout and Components of Metabolic Syndrome in Men and Women, NHANES 2007-2016\***

|  |  |  |
| --- | --- | --- |
|  | **Fully adjusted Odds ratio (95% CI) †** | |
| **Men**  N=5,005 | **Women**  N=4,335 |
| **Normal**  **Hyperuricemia** | 1.00 (Reference) | 1.00 (Reference) |
| 1.98 (1.41, 2.77) | 1.60 (0.70, 3.62) |
| **Normal**  **↑Triglycerides** | 1.00 (Reference) | 1.00 (Reference) |
| 2.05 (1.24, 3.39) | 1.27 (0.60, 2.67) |
| **Normal**  **↓HDL Cholesterol** | 1.00 (Reference) | 1.00 (Reference) |
| 1.12 (0.67, 1.88) | 1.64 (0.77, 3.50) |
| **Normal**  **↑Blood pressure** | 1.00 (Reference) | 1.00 (Reference) |
| 2.35 (1.60, 3.47) | 2.53 (1.28, 5.00) |
| **Normal**  **↑Fasting glucose** | 1.00 (Reference) | 1.00 (Reference) |
| 1.14 (0.80, 1.61) | 1.83 (1.01, 3.32) |
| **Normal**  **Metabolic syndrome‡** | 1.00 (Reference) | 1.00 (Reference) |
| 3.45 (2.32, 5.11) | 4.39 (1.58, 12.16) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 2007–2016, with incorporation of sample weights.

† Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise. eGFR and all the other components of metabolic syndrome.

‡ Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise and eGFR.

Gout prevalence: Men 5.4%, Women 2.4%

**Table 1 + Table 4**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Fully adjusted Odds ratio (95% CI) †** | | | |
| **Men** | | **Women** | |
| N=10,103 | N=5,005 | N=8,901 | N=4,335 |
| **Hyperuricemia** | **Gout** | **Hyperuricemia** | **Gout** |
| **Normal**  **↑Waist circumference** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 2.52 (2.18, 2.92) | 1.98 (1.41, 2.77) | 3.18 (2.63, 3.83) | 1.60 (0.70, 3.62) |
| **Normal**  **↑Triglycerides** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 1.46 (1.22, 1.76) | 2.05 (1.24, 3.39) | 1.27 (1.05, 1.54) | 1.27 (0.60, 2.67) |
| **Normal**  **↓HDL Cholesterol** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 0.96 (081, 1.15) | 1.12 (0.67, 1.88) | 1.37 (1.12, 1.68) | 1.64 (0.77, 3.50) |
| **Normal**  **↑Blood pressure** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 1.63 (1.39, 1.92) | 2.35 (1.60, 3.47) | 2.21 (1.82, 1.79) | 2.53 (1.28, 5.00) |
| **Normal**  **↑Fasting glucose** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 1.05 (0.90, 1.22) | 1.14 (0.80, 1.61) | 1.54 (1.32, 1.79) | 1.83 (1.01, 3.32) |
| **Normal**  **Metabolic syndrome‡** | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| 2.73 (2.32, 3.20) | 3.45 (2.32, 5.11) | 3.98 (3.38, 4.69) | 4.39 (1.58, 12.16) |

† Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise. eGFR and all the other components of metabolic syndrome.

‡ Adjusted for age, ethnicity, education level, smoking status, alcohol intake, regular exercise and eGFR.

Caution) Hyperuricemia: NHANES 1999–2020, Gout: NHANES 2007–2016

cf.) Gout prevalence: Men 5.4%, Women 2.4%

**Table 5. Association between Asthma and Hyperuricemia in Men and Women, NHANES 1999-2020\***

|  |  |  |
| --- | --- | --- |
| **Asthma** | **Adjusted Odds ratio (95% CI) †** | |
| **Men**  N=25,061 | **Women**  N=26,861 |
| **Normal**  **Hyperuricemia** | 1.00 (Reference) | 1.00 (Reference) |
| 1.12 (0.97, 1.29) | 1.18 (1.07, 1.30) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

† Adjusted for age and ethnicity.

**Table 6. Association between Kidney stone and Hyperuricemia in Men and Women, NHANES 2007-2020\***

|  |  |  |
| --- | --- | --- |
| **Kidney stone** | **Adjusted Odds ratio (95% CI) †** | |
| **Men**  N=16,571 | **Women**  N=17,580 |
| **Normal**  **Hyperuricemia** | 1.00 (Reference) | 1.00 (Reference) |
| 1.08 (0.92, 1.26) | 1.47 (1.24, 1.75) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 2007–2020, with incorporation of sample weights.

† Adjusted for age and ethnicity.

**Supplement**

**Adjustment variables**

Age: continuous

Gender: male, female

Ethnicity: white, black, hispanic, other

Education level: less than college education, college education or more

Smoking status: never, past, current

Alcohol intake: <2/week, ≥2/week

Regular exercise: <3/week, ≥3/week

eGFR (MDRD calculation): continuous

|  |  |
| --- | --- |
| **Used Diagnostic Criteria of Metabolic Syndrome** | |
| Measure (any 3 of 5) | Categorical Cutpoints |
| ↑Waist circumference | ≥102 cm in men (≥90 cm in Asian men: Table 2) |
|  | ≥88 cm in women (≥80 cm in Asian women: Table 2) |
| ↑Triglycerides | ≥150 mg/dL |
|  | Or on drug treatment for elevated triglycerides |
| ↓HDL Cholesterol | <40 mg/dL in men |
|  | <50 mg/dL in women |
|  | Or on drug treatment for reduced HDL-C |
| ↑Blood pressure | ≥130 mm Hg systolic blood pressure |
|  | Or ≥85 mm Hg diastolic blood pressure |
|  | Or on antihypertensive drug treatment |
| ↑Fasting glucose | ≥100 mg/dL |
|  | Or on drug treatment for elevated glucose |

**Table 1a. Association between Hyperuricemia and Components of Metabolic Syndrome in adults, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **All** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N=51,970 | N=23,240 | N=18,496 | N=8,545 |
| Normal (N=21,511) | 11.0 (10.4, 11.7) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=30,459) | 26.7 (26.0, 27.5) | 2.95 (2.75, 3.15) | 2.83 (2.51, 3.18) | 2.94 (2.46, 3.27) | 2.51 (2.08, 3.03) |
| **Triglycerides** |  | N=25,113 | N=11,133 | N=8,895 | N=8,545 |
| Normal (N=15,222) | 16.0 (15.1, 16.9) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=9,891) | 29.7 (28.4, 30.9) | 2.22 (2.03, 2.42) | 1.95 (1.66, 2.29) | 1.88 (1.57, 2.25) | 1.45 (1.15, 1.81) |
| **HDL Cholesterol** |  | N=51,942 | N=23,234 | N=18,490 | N=8,545 |
| Normal (N=29,905) | 15.9 (15.3, 16.5) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=22,037) | 25.8 (24.9, 26.8) | 1.85 (1.74, 1.96) | 1.63 (1.47, 1.81) | 1.61 (1.44, 1.80) | 1.05 (0.85, 1.28) |
| **Blood pressure** |  | N=49,482 | N=21,972 | N=17,820 | N=8,545 |
| Normal (N=26,569) | 13.7 (13.1, 14.3) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=22,913) | 28.8 (27.9, 29.7) | 2.55 (2.40, 2.71) | 2.27 (2.02, 2.54) | 2.27 (2.01, 2.57) | 2.06 (1.70, 2.49) |
| **Fasting glucose** |  | N=25,282 | N=11,310 | N=9,010 | N=8,545 |
| Normal (N=12,385) | 15.7 (14.8, 16.6) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=12,897) | 26.9 (25.8, 28.0) | 1.97 (1.81, 2.14) | 1.76 (1.53, 2.02) | 1.67 (1.45, 1.93) | 1.34 (1.16, 1.55) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age, sex and ethnicity

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 1b. Association between Hyperuricemia and Components of Metabolic Syndrome in Men, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Men** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N=25,091 | N=11,251 | N=9,664 | N=4,531 |
| Normal (N=13,477) | 13.8 (12.9, 14.7) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=11,614) | 30.0 (26.7, 29.2) | 2.42 (2.21, 2.66) | 2.53 (2.12, 3.01) | 2.56 (2.07, 3.16) | 2.34 (1.82, 3.01) |
| **Triglycerides** |  | N=12,114 | N=5,398 | N=4,678 | N=4,531 |
| Normal (N=6,905) | 17.1 (15.8, 18.5) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=5,209) | 26.7 (25.1, 28.4) | 1.77 (1.56, 2.00) | 1.75 (1.39, 2.21) | 1.64 (1.28, 2.09) | 1.58 (1.12, 2.23) |
| **HDL Cholesterol** |  | N=25,078 | N=11,249 | N=9,662 | N=4,531 |
| Normal (N=14,809) | 18.1 (17.2, 19.0) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=10,269) | 23.9 (22.6, 25.2) | 1.42 (1.30, 1.56) | 1.31 (1.13, 1.53) | 1.29 (1.09, 1.53) | 0.76 (0.57, 1.01) |
| **Blood pressure** |  | N=24,086 | N=10,760 | N=9,368 | N=4,531 |
| Normal (N=12,204) | 16.4 (15.5, 17.3) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=11,882) | 25.5 (24.3, 26.8) | 1.75 (1.60, 1.91) | 1.86 (1.58, 2.20) | 1.78 (1.49, 2.12) | 1.64 (1.30, 2.07) |
| **Fasting glucose** |  | N=12,200 | N=5,485 | N=4,746 | N=4,531 |
| Normal (N=5,002) | 18.8 (17.3, 20.3) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=7,198) | 22.9 (21.5, 24.3) | 1.28 (1.14, 1.44) | 1.39 (1.12, 1.72) | 1.32 (1.06, 1.64) | 1.13 (0.90, 1.43) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and ethnicity.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 1c. Association between Hyperuricemia and Components of Metabolic Syndrome in Women, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Women** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N=26,879 | N=11,989 | N=8,832 | N=4,014 |
| Normal (N=8,034) | 6.9 (6.2, 7.7) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=18,845) | 25.9 (25.0, 26.8) | 4.71 (4.19, 5.31) | 3.87 (3.15, 4.74) | 3.86 (3.10, 4.80) | 3.28 (2.41, 4.47) |
| **Triglycerides** |  | N=12,999 | N=5,735 | N=4,217 | N=4,014 |
| Normal (N=8,317) | 15.0 (14.0, 16.1) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=4,682) | 33.1 (31.3, 34.9) | 2.79 (2.46, 3.17) | 2.12 (1.73, 2.60) | 2.10 (1.65, 2.67) | 1.22 (0.94, 1.58) |
| **HDL Cholesterol** |  | N=26,864 | N=11,985 | N=8,828 | N=4,014 |
| Normal (N=15,096) | 13.7 (13.0, 14.5) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=11,768) | 27.5 (26.3, 28.7) | 2.39 (2.20, 2.60) | 2.11 (1.84, 2.42) | 2.12 (1.80, 2.48) | 1.53 (1.15, 2.05) |
| **Blood pressure** |  | N=25,396 | N=11,212 | N=8,452 | N=4,014 |
| Normal (N=14,365) | 11.2 (10.6, 11.9) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=11,031) | 32.1 (31.0, 33.3) | 3.74 (3.45, 4.05) | 2.62 (2.28, 3.02) | 2.81 (2.40, 3.29) | 2.63 (1.96, 3.54) |
| **Fasting glucose** |  | N=13,082 | N=5,825 | N=4,264 | N=4,014 |
| Normal (N=7,383) | 13.6 (12.6, 14.6) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=5,699) | 32.1 (30.5, 33.6) | 3.01 (2.68, 3.37) | 2.09 (1.76, 2.48) | 2.04 (1.70, 2.46) | 1.50 (1.05, 9.62) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and ethnicity.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 2a. Association between Hyperuricemia and Components of Metabolic Syndrome in White, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **White** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N=21,923 | N=21,923 | N=18,883 | N=7,976 |
| Normal (N=9,143) | 10.7 (9.9, 11.6) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=12,780) | 27.4 (26.4, 28.3) | 3.14 (2.86, 3.45) | 3.04 (2.76, 3.36) | 3.00 (2.70, 3.34) | 2.72 (2.31, 3.20) |
| **Triglycerides** |  | N=11,097 | N=11,097 | N=9,411 | N=7,976 |
| Normal (N=6,292) | 16.3 (15.0, 17.5) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=4,805) | 30.2 (28.5, 31.9) | 2.23 (1.97, 2.52) | 2.06 (1.81, 2.33) | 1.92 (1.67, 2.19) | 1.34 (1.13, 1.59) |
| **HDL Cholesterol** |  | N=22,914 | N=22,914 | N=19,379 | N=7,976 |
| Normal (N=12,889) | 16.0 (15.2, 16.9) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=10,025) | 26.6 (25.4, 27.8) | 1.90 (1.75, 2.06) | 1.77 (1.63, 1.92) | 1.73 (1.58, 1.90) | 1.11 (0.92, 1.33) |
| **Blood pressure** |  | N=22,058 | N=22,058 | N=18,935 | N=7,976 |
| Normal (N=11,631) | 14.1 (13.3, 14.9) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=10,427) | 28.8 (27.7, 29.9) | 2.46 (2.28, 2.66) | 2.29 (2.09, 2.51) | 2.25 (2.03, 2.49) | 1.99 (1.65, 2.40) |
| **Fasting glucose** |  | N=11,148 | N=11,148 | N=9.454 | N=7,976 |
| Normal (N=5,608) | 16.3 (15.1, 17.5) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=5,540) | 27.8 (26.2, 29.3) | 1.97 (1.76, 2.21) | 1.82 (1.62, 2.04) | 1.76 (1.54, 2.00) | 1.30 (1.12, 1.50) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and sex.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 2b. Association between Hyperuricemia and Components of Metabolic Syndrome in Black, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Black** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N=10,191 | N=10,191 | N=8,075 | N=3,449 |
| Normal (N=4,079) | 12.1 (10.9, 13.2) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=6,112) | 30.0 (28.8, 31.3) | 3.13 (2.77, 3.54) | 3.08 (2.70, 3.52) | 3.01 (2.60, 3.48) | 2.68 (2.14, 3.38) |
| **Triglycerides** |  | N=5,097 | N=5,097 | N=3,970 | N=3,449 |
| Normal (N=3,696) | 19.5 (18.2, 20.8) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=1,401) | 37.4 (34.4, 40.4) | 2.46 (2.12, 2.85) | 1.87 (1.60, 2.20) | 1.73 (1.44, 2.08) | 1.40 (1.06, 1.85) |
| **HDL Cholesterol** |  | N=10,766 | N=10,766 | N=8,321 | N=3,449 |
| Normal (N=6,813) | 19.0 (17.9, 20.1) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=3,953) | 31.5 (29.8, 33.3) | 1.96 (1.76, 2.19) | 1.69 (1.51, 1.89) | 1.64 (1.46, 1.85) | 0.98 (0.76, 1.28) |
| **Blood pressure** |  | N=10,175 | N=10,175 | N=8,043 | N=3,449 |
| Normal (N=4,432) | 12.9 (11.8, 14.1) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=5,743) | 33.4 (31.9, 34.8) | 3.37 (2.98, 3.80) | 2.38 (2.09, 2.71) | 2.40 (2.08, 2.76) | 1.68 (1.32, 2.12) |
| **Fasting glucose** |  | N=5,144 | N=5,144 | N=4,003 | N=3,449 |
| Normal (N=2,693) | 16.6 (15.0, 18.2) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=2,451) | 33.5 (31.6, 35.3) | 2.53 (2.20, 2.90) | 1.91 (1.64, 2.22) | 1.84(1.57, 2.17) | 1.33 (1.10, 1.60) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and sex.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 2c. Association between Hyperuricemia and Components of Metabolic Syndrome in Hispanic, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hispanic** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N= | N= | N= | N=4,359 |
| Normal (N=5,346) | 9.5 (8.2, 10.8) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=7,538) | 19.1 (17.9, 20.4) | () | () | () | 2.46 (1.91, 3.17) |
| **Triglycerides** |  | N= | N= | N= | N=4,359 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.68 (1.26, 2.24) |
| **HDL Cholesterol** |  | N= | N= | N= | N=4,359 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=) | () | () | () | () | 1.09 (0.86, 1.40) |
| **Blood pressure** |  | N= | N= | N= | N=4,359 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.80 (1.34, 2.40) |
| **Fasting glucose** |  | N= | N= | N= | N=4,359 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.22 (0.97, 1.53) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and sex.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 2d. Association between Hyperuricemia and Components of Metabolic Syndrome in Other, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Other** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N= | N= | N= | N=1,436 |
| Normal (N=2,943) | 14.4 (12.8, 16.0) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=1,671) | 28.7 (25.9, 31.6) | () | () | () | 1.78 (1.23, 2.57) |
| **Triglycerides** |  | N= | N= | N= | N=1,436 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.81 (1.17, 2.80) |
| **HDL Cholesterol** |  | N= | N= | N= | N=1,436 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=) | () | () | () | () | 1.19 (0.80, 1.77) |
| **Blood pressure** |  | N= | N= | N= | N=1,436 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.52 (1.07, 2.16) |
| **Fasting glucose** |  | N= | N= | N= | N=1,436 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.43 (0.98, 2.08) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 1999–2020, with incorporation of sample weights.

Model 1: adjusted for age and sex.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table 2e. Association between Hyperuricemia and Components of Metabolic Syndrome in Asian, NHANES 2011-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Asian** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **Waist circumference** |  | N= | N= | N= | N=796 |
| Normal (N=1,016) | 12.6 (10.3, 14.8) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=1,657) | 25.3 (22.4, 28.3) | () | () | () | 2.15 (1.44, 3.20) |
| **Triglycerides** |  | N= | N= | N= | N=796 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 0.97 (0.59, 1.58) |
| **HDL Cholesterol** |  | N= | N= | N= | N=796 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Reduced (N=) | () | () | () | () | 1.62 (0.99, 2.64) |
| **Blood pressure** |  | N= | N= | N= | N=796 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.22 (0.84, 1.77) |
| **Fasting glucose** |  | N= | N= | N= | N=796 |
| Normal (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Elevated (N=) | () | () | () | () | 1.32 (0.83, 2.11) |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 2011–2020, with incorporation of sample weights.

Model 1: adjusted for age and sex.

Model 2: adjusted for model 1 covariates plus education level, smoking status, alcohol intake, and regular exercise.

Model 3: adjusted for model 2 covariates plus estimated glomerular filtration rate and all the other covariates in the table.

**Table . Association between Hyperuricemia and Elevated Waist circumference according to Cycle in the US, NHANES 1999-2020\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Model3 Odds ratio (95% CI)** | | | | |
| **Waist circumference** | | **Triglycerides** | **HDL Cholesterol** | **Blood pressure** | **Fasting glucose** |
| **NHANES 1999-2000** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2001-2002** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2003-2004** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2005-2006** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2007-2008** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2009-2010** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2011-2012** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2013-2014** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2015-2016** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |
| **NHANES 2017-2020** | N= | | N= | N= | N= | N= |
| Normal | 1.00 (Reference) | | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Abnormal | () | | () | () | () | () |

\* The data were adjusted for clusters and strata of the complex sample design of the National Health and Nutrition Examination Survey (NHANES) 2011–2020, with incorporation of sample weights.

Model 3: adjusted for age, sex, ethnicity, education level, smoking status, alcohol intake, regular exercise. estimated glomerular filtration rate and all the other covariates in the table.

**Table . Association between Hyperuricemia and Elevated Waist circumference according to Cycle in adults in the US, NHANES 1999-2020\***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **↑Waist circumference** | **Hyperuricemia,**  **% (95% CI)** | **Odds ratio (95% CI)** | | | |
| **Unadjusted** | **Model 1** | **Model 2** | **Model 3** |
| **NHANES 1999-2000** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2001-2002** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2003-2004** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2005-2006** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2007-2008** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2009-2010** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2011-2012** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2013-2014** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2015-2016** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |
| **NHANES 2017-2020** |  | N= | N= | N= | N= |
| Negative (N=) | () | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) | 1.00 (Reference) |
| Positive (N=) | () | () | () | () | () |