Sex-specific and Obesity-specific Association of Serum Uric Acid with Cognitive Function in Older Adults

Carol L. Cheatham,1,2 Izel Vazquez-Vidal,2,3 Christa L. Turski,2 Amanda Medlin,4 Grace Millsap,2 V. Saroo Vorguanti2,3

1Department of Psychology and Neuroscience, University of North Carolina at Chapel Hill
2UNC Chapel Hill Nutrition Research Institute, North Carolina Research Campus, Kannapolis, NC
3Department of Nutrition, University of North Carolina at Chapel Hill, Kannapolis, NC
4University of North Carolina Charlotte, Charlotte, NC

BACKGROUND

• Uric acid is an antioxidant that accounts for over half of the free radical scavenging activity in humans.1
• Lower serum uric acid concentrations (SUA) have been linked to cognitive dysfunction.1
• Higher SUA concentrations have been associated with slower progression of some neurodegenerative diseases.2
• On the other hand, elevated SUA concentrations have also been associated with poorer processing speed and executive functioning and greater white matter atrophy.1,3

AIM

• To explore the relation between uric acid concentrations and cognitive function in a population of older adults with mild cognitive decline using biomarkers, cognitive testing, and demographics.

RESULTS

Table 1: Pearson’s correlation coefficients for SUA with uric and serum profiles.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SUA</th>
<th>BMI</th>
<th>FEUA</th>
<th>Chol</th>
<th>Trig</th>
<th>HDL-C</th>
<th>LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal BMI</td>
<td>0.03 ± 0.08</td>
<td>-0.03 ± 0.45*</td>
<td>0.45 ± 0.27*</td>
<td>-0.09 ± 0.31*</td>
<td>-0.43* ± 0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males (n=47)</td>
<td>0.11 ± 0.24</td>
<td>-0.18 ± 0.34*</td>
<td>-0.05 ± 0.1</td>
<td>0.30* ± -0.19</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females (n=60)</td>
<td>0.11 ± 0.34*</td>
<td>-0.03 ± 0.55*</td>
<td>0.30* ± 0.45*</td>
<td>-0.01</td>
<td>0.42* ± -0.42*</td>
<td>-0.01</td>
<td></td>
</tr>
</tbody>
</table>

Pearson’s correlation coefficient for SUA with cognitive scores.

Table 2: Pearson’s correlation coefficients for SUA with cognitive scores.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>MoCA</th>
<th>Between errors score</th>
<th>Within errors score</th>
<th>Total hits score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n=107)</td>
<td>-0.23*</td>
<td>-0.02</td>
<td>0.05</td>
<td>-0.08</td>
</tr>
<tr>
<td>Males (n=47)</td>
<td>-0.14</td>
<td>-0.11</td>
<td>0.16</td>
<td>0.08</td>
</tr>
<tr>
<td>Females (n=60)</td>
<td>-0.19</td>
<td>-0.11</td>
<td>-0.03</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Pearson’s correlation coefficient for SUA with cognitive scores.

DISCUSSION AND CONCLUSION

• SUA was significantly correlated with BMI, WC, serum creatinine, glucose, triglycerides, and HDL-C (Table 1).
• Pearson’s correlation coefficient test showed that SUA was negatively associated with MoCA scores (r= -0.23, p<0.05) (Table 2).
• SUA was positively associated with errors made on the CANTAB spatial working memory task (r=2.6, p<0.01) in men but not in women.
• SUA was positively associated with spatial working memory errors (r=2.9, p<0.01) and rapid visual processing errors (r=3.0, p<0.01) from the CANTAB in obese individuals but not in normal or overweight individuals.

REFERENCES


ACKNOWLEDGMENTS

The authors would like to thank the participants, the Chapel Hill the Vorguanti Lab, and the University of North Carolina at Chapel Hill Nutrition Research Institute for their support of this project. This research was funded by the USDA ARS IRRS Grant 58-6430-4-003.

METHODS

• Study population: Adults 65 to 79 years old who are beginning to experience mild cognitive decline, but are generally healthy, were enrolled in this study.
• Blood biomarkers: Serum lipid profiles, glucose, creatinine, and SUA were analyzed in fasting blood with an automated enzymatic procedure.
• Inclusion criteria: Daily fruit/vegetable intake < 5 servings; not diagnosed with dementia or Alzheimer’s disease, central nervous system disorders, psychiatric diseases, gastrointestinal/digestive problems, or diabetes; body mass index (BMI) < 34.9 lbs./m2; not taking certain prescription drugs; and right-handed
• Statistical analysis: Analyses were carried out using SAS version 9.3 (SAS Institute, Cary, NC, USA).

• Cognitive function: Cognitive function was assessed using the Montreal Cognitive Assessment (MoCA, Fig 1), and the Spatial Working Memory (Fig 2) and Rapid Visual Information Processing (Fig 3) tests from the Cambridge Neuropsychological Test Automated Battery (CANTAB).