DEXA-Measured VAT Robustly Predicts Impaired Glucose Tolerance and Metabolic Syndrome in Obese Women

Xia Bi
Jefferson Medical College, Thomas Jefferson University

C. D. Keil
Vanderbilt University

L. Seabolt
Vanderbilt University

R. Tyree
Vanderbilt University

M. Buchowski
Vanderbilt University

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ABSTRACT

Abdominal visceral adiposity (VAT) has been shown to be an independent risk factor for metabolic and cardiovascular disease. Using enCORE analysis version 13.6 on a GE Lunar iDXA, a new fully automated analysis software to measure VAT, we determined the strength of associations between DEXA-derived VAT and other known indicators for diabetes and cardiovascular disease risk in Caucasian and African American obese women. We collected anthropometrics, vital signs, lipid profile, and DXA whole body composition scan for 229 subjects with BMI 30.0 – 49.9 kg/m² & age 21 to 69 y. We then performed the non-parametric Spearman correlation analysis and found that in subjects overall, DEXA-VAT is positively associated with triglyceride, fasting glucose, fasting insulin, and HOMA-IR, and negatively associated with HDL. Among all anthropometric, body composition variables, DEXA-VAT was the most robust predictor of impaired glucose tolerance (IGT) and metabolic syndrome (MetSx) in binary regression analysis, even after adjusting for race. LASSO regression after adjusting for covariates that best predicted IGT and MetSx showed that HOMA-IR and DEXA-VAT most significantly predicted IGT (p<0.001, p=0.001, respectively), and DEXA-VAT most significantly predicted MetSx (p<0.001). These observations have implications for VAT associated risk in diabetes and cardiovascular disease.

METHODS

Study: Cross-sectional design of subjects previously recruited for studies at the Vanderbilt Clinical Research Center.

Subjects: 229 subjects with BMI 30.0 – 49.9 kg/m² & age 21 to 69 y. All records de-identified.

Measures

Anthropometrics

Height, weight, BMI, Waist & hip circumference (WC & HC), waist-to-hip ratio (WHR), waist-to-height ratio (WHR)

Lipid profile

Total cholesterol, HDL, LDL, triglyceride (TG)

Fasting glucose, insulin, HOMA-IR

DEXA whole body composition scan

Metabolic disease states

- Impaired Glucose tolerance (IGT): fasting glucose ≥100 mg/dL
- Metabolic Syndrome defined as ≥ 3 of the following: 1. WC (>102 cm for; >88 cm for); 2. TG (≥150 mg/dl); 3. HDL (<40 mg/dl in ; <50 mg/dl in); 4. Hypertension (≥130/85 mmHg); 5. Impaired fasting glucose (≥100 mg/dl).

Analysis: R version 3.0.1 analyzed with non-parametric distribution.

RESULTS

DEXA-VAT Associations with Metabolic Risk Factors

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>p value</th>
<th>DEXA-VAT adjusted for Race</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP</td>
<td>0.01</td>
<td>&lt;0.001</td>
<td>0.24</td>
</tr>
<tr>
<td>DBP</td>
<td>0.01</td>
<td>&lt;0.001</td>
<td>0.19</td>
</tr>
<tr>
<td>HR</td>
<td>0.37</td>
<td>0.96</td>
<td>0.42</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>0.51</td>
<td>0.72</td>
<td>0.06</td>
</tr>
<tr>
<td>HDL</td>
<td>&lt;0.001</td>
<td>0.62</td>
<td>0.85</td>
</tr>
<tr>
<td>LDL</td>
<td>0.13</td>
<td>0.13</td>
<td>0.06</td>
</tr>
<tr>
<td>TG</td>
<td>&lt;0.001</td>
<td>0.08</td>
<td>0.95</td>
</tr>
<tr>
<td>HsCRP</td>
<td>0.33</td>
<td>0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>Insulin</td>
<td>&lt;0.001</td>
<td>0.43</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Overall, DEXA-VAT was positively associated with SBP, DBP, TG, fasting glucose & insulin, HOMA-IR, and negatively associated with HDL. DEXA-VAT was still associated with SBP, DBP, insulin, and HOMA-IR after adjusting for race, and associated with HsCRP after adjusting for the int’n with race.

REFERENCES


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