BMI, Gestational Weight Gain and Angiogenic Biomarker Profiles for Preeclampsia Risk

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Background

- In May 2009, after considering short and long-term maternal/child outcomes, the Institute of Medicine (IOM) revised recommendations for gestational weight gain (GWG), however preclampsia was dismissed due to insufficient evidence. (IOM 2009)
- Since change in recommendations, epidemiologic studies have since been published that support an association between GWG adherence and hypertensive disease of pregnancy. (AOG 2009;200(2):167.e1-7)
- Numerous studies have revealed adipose tissue's ability to stimulate angiogenesis. (Cardiovascular Res 2008;78(2):386-93)

Objective

To evaluate preclampsia risk by angiogenic-biomarker profile by both BMI and GWG-adherence.

Hypothesis

We hypothesized that overweight/obese (OW-OB) and over-gainers (OG) would have altered angiogenic profiles as compared to underweight-normal-weight (U-N) and under-/appropriate-gainers (U-AG), respectively.

Materials & Methods

- Pregnant subjects <24 weeks gestation enrolled from outpatient prenatal clinics at UMass Memorial Health Care between May 2004 and January 2006.
- Each subject had >31 BMI

Inclusion Criteria

RR

- Chronic HTN 2.37
- Renal Disease/COD -----
- Pregestational DM 3.56
- History of Preecclampsia 7.19
- Teen Pregnancy (<18) 2.98
- Multi-fetal gestation 2.93 (twins)
- Obesity (BMI > 30) 2.47
- APL Ab Syndrome 0.72
- SLE ----- (Duckitt K & Harrington D. BMI, 2005)

Exclusions

- Subjects included in analyses 82 (342 samples)
- Subjects recruited 127
- Subjects >24 weeks gestation enrolled from outpatient prenatal clinics at UMass Memorial Health Care between May 2004 and January 2006.
- Each subject had >31 BMI

BMI & GWG adherence categories by 1990 IOM recommendations

- Pre-pregnancy BMI* Total GWG at 40 weeks
  - Underweight (<19.0) 26.0-30.0
  - Normal weight (19.0-20.0) 22.0-27.0
  - Overweight (20.0-24.9) 21.0-25.9
  - Obese (≥25.0) 20.0-24.9

GWG Adherence Comparisons (see Figures 4–6)

- Mean sFlt1 lower in all windows in OG compared to U-AG (Figure 4)
- Mean PlGF lower in all windows in OG compared to U-AG (Figure 5)
- Mean ratio [(sFlt1+Eng):PlGF] trended higher in OG compared to U-AG at 31-36wks (Figure 6)

Limitations

- Small sample size required collapsing of BMI and GWG-adherence categories; thus unable to look at adherence within each BMI category
- Secondary analysis not powered for this exploratory analysis
- Only had total GWG at end of pregnancy

Table 1. Demographic comparisons

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>Underweight</th>
<th>Normal</th>
<th>Overweight</th>
<th>Under/Propr Gain</th>
<th>Over-Gain</th>
<th>P-Value</th>
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<tr>
<td>Age (years)</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
<td>Mean±SD</td>
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<tr>
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<td>25.9±8.5</td>
<td>31.1±6.6</td>
<td>25.9±7.4</td>
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<td>27.1±10.2</td>
<td>27.5±10.2</td>
<td>27.1±10.2</td>
<td>27.1±10.2</td>
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<td></td>
</tr>
</tbody>
</table>

Results

- Analytic sample included 82 subjects (342 specimens). See Table 1 for Demographic Comparisons.
- BMI Comparisons (see Figures 1–3)
  - Mean sFlt1 lower in all windows in OW-OB compared to U-N (Figure 1)
  - Mean PlGF lower in all windows in OW-OB compared to U-N (Figure 2)
  - Mean ratio [(sFlt1+Eng):PlGF] trended higher in OW-OB compared to U-N women at 27-30 and 31-36wks (Figure 3)

1. Geometric mean sFlt1 (95% CI)
2. Geometric mean PlGF (95% CI)
3. Geometric mean [(sFlt1+Eng)/PlGF] (95% CI)

4. Geometric mean sFlt1 (95% CI)
5. Geometric mean PlGF (95% CI)
6. Geometric mean [(sFlt1+Eng)/PlGF] (95% CI)

Figure 1-3. Angiogenic biomarker profiles comparing under-/normal-weight to overweight/obese at 3 gestational age windows

4. Geometric mean sFlt1 (95% CI)
5. Geometric mean PlGF (95% CI)
6. Geometric mean [(sFlt1+Eng)/PlGF] (95% CI)

4. Geometric mean sFlt1 (95% CI)
5. Geometric mean PlGF (95% CI)
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