Obesity and Breast Cancer Risk in Hispanics: Findings from the Breast Cancer Health Disparities Study

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Why Study Body Size Associations in Hispanic Women?

- **Obesity is a well established risk factor in non-Hispanic white women**
  - Few studies in Hispanics
  - Small sample sizes
  - Contradictory findings compared to NHW women
  - Some interpretations of no associations with body size in Hispanics

- **Higher prevalence of overall and abdominal obesity in Hispanics**

- **Increasing prevalence of obesity in last 25 years**

- **Potentially modifiable lifestyle factor**
  - Direct relevance for breast cancer prevention
Obesity and Breast Cancer Risk

- Most studies were conducted in non-Hispanic white women
- The relationship between obesity and breast cancer is complex
- The relationship depends on:
  - Menopausal status (pre- vs. postmenopausal)
  - Menopausal hormone use (not current HT users)
  - Timing of obesity (adolescence, young-adult, current)
  - Location of body fat (overall vs. abdominal obesity)
  - Type of breast cancer (ER/PR status)
The Breast Cancer Health Disparities Study

- Combined data from 2 U.S. population-based case-control studies
  - San Francisco Bay Area Breast Cancer Study
    5 counties in San Francisco Bay Area
    Diagnosis 1995-2002
  - 4-Corners Breast Cancer Study
    Utah, Colorado, New Mexico, Arizona
    Diagnosis 1999-2004

- Large sample size
  - 3,285 Hispanics (1,256 cases and 2,029 controls)
  - 3,485 NHWs (1,385 cases and 2,100 controls)

- Similar data collection
  - In-person interview, including weight at different ages
  - Body measurements
    weight, height, waist and hip circumferences
Body Size among Premenopausal Controls
The Breast Cancer Health Disparities Study (BCHDS)

Percent of Controls with Large Body Size by Ethnicity

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Young-adult BMI (Quartile 4)</th>
<th>Current BMI (≥30 kg/m²)</th>
<th>Weight Gain (Quartile 4)</th>
<th>Waist Circumference (Quartile 4)</th>
<th>Hip Circumference (Quartile 4)</th>
<th>Waist-to-Hip Ratio (Quartile 4)</th>
<th>Waist-to-Height Ratio (Quartile 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanics (N=765)</td>
<td>34%</td>
<td>14%</td>
<td>20%</td>
<td>27%</td>
<td>23%</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>NHWs (N=653)</td>
<td>35%</td>
<td>20%</td>
<td>23%</td>
<td>29%</td>
<td>20%</td>
<td>14%</td>
<td>16%</td>
</tr>
</tbody>
</table>

* P <0.05
Body Size among Postmenopausal Controls
The Breast Cancer Health Disparities Study (BCHDS)

Percent of Controls with Large Body Size by Ethnicity

- Hispanics (N=1,264)
- NHWs (N=1,447)

<table>
<thead>
<tr>
<th>Body Size Measure</th>
<th>Hispanics</th>
<th>NHWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young-adult BMI (Quartile 4) *</td>
<td>33%</td>
<td>18%</td>
</tr>
<tr>
<td>Current BMI (≥30 kg/m²) *</td>
<td>41%</td>
<td>28%</td>
</tr>
<tr>
<td>Weight Gain (Quartile 4)</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Waist Circumference (Quartile 4) *</td>
<td>28%</td>
<td>22%</td>
</tr>
<tr>
<td>Hip Circumference (Quartile 4) *</td>
<td>27%</td>
<td>23%</td>
</tr>
<tr>
<td>Waist-to-Hip Ratio (Quartile 4) *</td>
<td>32%</td>
<td>19%</td>
</tr>
<tr>
<td>Waist-to-Height Ratio (Quartile 4) *</td>
<td>32%</td>
<td>18%</td>
</tr>
</tbody>
</table>

* P <0.05
Body Size and Premenopausal Breast Cancer Risk

- Analyses by joint ER/PR status
- Adolescent body size
  - Relative weight compared to peers (ages 10, 15, 20 yrs)
  - Drawings of body figures (ages 10, 15, 20 yrs)
- Young-adult BMI (BMI in a woman’s twenties)
- Current BMI
- Weight gain since the twenties
- Abdominal obesity
  - Waist circumference
  - Hip circumference
  - Waist-to-hip ratio
  - Waist-to-height ratio
Relative Weight Compared to Peers
Premenopausal Breast Cancer Risk in SFBCS

210 cases, 265 controls
Adjusted for age, current BMI, and breast cancer risk factors
Sangaramoorthy et al. CEBP 2011;20(12):2572-82.
Relative weight compared to peers at age 15 years

\[ P_{\text{trend}} < 0.01 \]

Relative weight compared to peers at age 20 years

\[ P_{\text{trend}} = 0.02 \]

210 cases, 265 controls
Adjusted for age, current BMI, and breast cancer risk factors
Sangaramoorthy et al. CEBP 2011;20(12):2572-82.
Young-adult BMI and Current BMI
Premenopausal ER+PR+ Breast Cancer Risk in BCHDS

285 ER+PR+ cases, 765 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Weight Gain, by Young-adult BMI
Premenopausal ER+PR+ Breast Cancer Risk in BCHDS

285 ER+PR+ cases, 765 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Young-adult BMI and Current BMI
Premenopausal ER-PR- Breast Cancer Risk in BCHDS

Young-adult BMI (tertiles)

- \( P_{\text{trend}} < 0.01 \)
- Per 5 kg/m\(^2\): OR=0.73 (0.55-0.95)

Current BMI (kg/m\(^2\))

- \( P_{\text{trend}} = 0.15 \)
- Per 5 kg/m\(^2\): OR=0.83 (0.71-0.98)

142 ER-PR- cases, 765 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Weight Gain
Premenopausal ER-PR- Breast Cancer Risk in BCHDS

142 ER-PR- cases, 765 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Location of Fat Accumulation

Apple shape vs pear shape

Apple shape
- More visceral fat
- Higher risk of weight-related health problems

Above the waist

Below the waist

Pear shape
- Less visceral fat
- Lower risk of weight-related health problems
**Abdominal Obesity**

**Premenopausal Breast Cancer Risk in BCHDS**

- Restricted to measurements taken <12 months after diagnosis or selection into study
- 71 cases, 561 controls
- Adjusted for age, study, English language acculturation, current BMI, and breast cancer risk factors

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**Waist circumference (tertiles)**

\[ P_{\text{trend}} = 0.07 \]

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**Waist-to-hip ratio (tertiles)**

\[ P_{\text{trend}} = 0.06 \]
Summary: Premenopausal Breast Cancer

- Inverse association with adolescent relative weight, regardless of tumor hormone receptor status

- Inverse association with young-adult BMI, regardless of tumor hormone receptor status

- Inverse associations with current overweight and obesity, in the presence of elevated young-adult BMI, with ER+PR+ breast cancer

- Suggestive positive associations with waist circumference and WHR (borderline trends)
Body Size and Postmenopausal Breast Cancer Risk

- Analyses in women not currently using menopausal hormone therapy (HT)
- Analyses by joint ER/PR status
- Adolescent body size
- Young-adult BMI (BMI in a woman’s twenties)
- Current BMI
- Weight gain since the twenties
- Abdominal obesity
  - Waist circumference
  - Hip circumference
  - Waist-to-hip ratio
  - Waist-to-height ratio
Relative Weight Compared to Peers
Postmenopausal Breast Cancer Risk in SFBCS

- Overall no significant association with adolescent relative weight
- Inverse associations in US-born Hispanic women
  
  Relative weight at age 10 years:  \( p = 0.01 \)
  Relative weight at age 15 years:  \( p = 0.08 \)
  Relative weight at age 20 years:  \( p = 0.04 \)

Sangaramoorthy et al. CEBP 2011;20(12):2572-82.
Young-adult BMI and Current BMI
Postmenopausal ER+PR+ Breast Cancer Risk in BCHDS

No current HT use: 294 ER+PR+ cases, 961 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Young-adult BMI further adjusted for current BMI; current BMI further adjusted for weight gain
Weight gain, by Young-adult BMI
Postmenopausal ER+PR+ Breast Cancer Risk in BCHDS

No current HT use: 294 ER+PR+ cases, 961 controls
Adjusted for age, study, English language acculturation, current BMI, and breast cancer risk factors
Young-adult BMI and Current BMI
Postmenopausal ER-PR- Breast Cancer Risk in BCHDS

No current HT use: 153 ER+PR+ cases, 1,264 controls
Adjusted for age, study, English language acculturation, and breast cancer risk factors
Young-adult BMI further adjusted for current BMI; current BMI further adjusted for weight gain
Weight Gain
Postmenopausal ER-PR- Breast Cancer Risk in BCHDS

No current HT use: 153 ER-PR- cases, 1,264 controls
Adjusted for age, study, English language acculturation, current BMI, and breast cancer risk factors

Weight gain (tertiles)

\[ P_{\text{trend}} = 0.67 \]
Abdominal Obesity
Postmenopausal Breast Cancer Risk

No association with
- Waist circumference
- WHR
- WHtR

Restricted to measurements taken <12 months after diagnosis or selection into study
127 cases, 913 controls
Adjusted for age, study, English language acculturation, current BMI, and breast cancer risk factors
Summary: Postmenopausal Breast Cancer

- **ER+PR+ breast cancer among not current HT users**
  - Inverse association of young-adult BMI
  - Positive association with weight gain, but only for women with a low young-adult BMI
  - No association for women with elevated young-adult BMI and current obesity

- **ER-PR- breast cancer**
  - Suggestive inverse association with young-adult BMI
  - Suggestive inverse association with current BMI

- Positive association with hip circumference
Conclusions

- Our findings suggest that body size associations in U.S. Hispanics are similar to those reported for NHW women.

- Early-life body size seems to play an important role in breast cancer etiology:
  - Premenopausal BC: Reduced risk associated with large adolescent and young-adult body size.
  - Inverse associations did not differ by ER/PR status.
  - Postmenopausal BC: Pattern of reduced risk is less clear (non-significant findings).

- Young-adult body size also modifies associations with weight gain:
  - Positive associations with ER+PR+ breast cancer are seen only in postmenopausal women with a low young-adult BMI.

- Body size associations are specific to tumor ER/PR status.
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