Healthcare Disparities in Obesity Treatment

FATIMA CODY STANFORD, MD, MPH, MPA, FAAP, FACP, FTOS
OBESITY MEDICINE & NUTRITION, MGH WEIGHT CENTER
AMERICAN BOARD OF OBESITY MEDICINE DIPLOMATE
**Objectives**

<table>
<thead>
<tr>
<th>Discuss</th>
<th>Discuss racial and ethnic disparities in the prevalence, treatment, and pathophysiology of obesity.</th>
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</thead>
<tbody>
<tr>
<td>Explore</td>
<td>Explore issues surrounding obesity and socioeconomic status, education level, and provider diagnosis in obesity.</td>
</tr>
<tr>
<td>Understand</td>
<td>Understand differences in response to treatment of racial and ethnic minorities with regards to pharmacotherapy and weight loss surgery.</td>
</tr>
</tbody>
</table>
Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2011

Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

*Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.*
Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2012
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Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2015
Prevalence of Self-Reported Obesity Among Non-Hispanic White Adults, by State and Territory, BRFSS, 2013-2015
Prevalence of Self-Reported Obesity Among Hispanic Adults, by State and Territory, BRFSS, 2013-2015
Prevalence of Self-Reported Obesity Among Non-Hispanic Black Adults, by State and Territory, BRFSS, 2013-2015
Mean (95% CI) abdominal visceral adipose tissue (VAT) area (top panels) and subcutaneous adipose tissue (SAT) area (bottom panels) in African American and white men and women aged <45 and ≥45 y.

Ethnic and sex differences in visceral, subcutaneous, and total body fat in children and adolescents

[Graph showing differences in body fat across different age groups and ethnicities.]
Markers of Inflammation in African-American versus Non-Hispanic White Patients

- 126 healthy, premenopausal women, BMI 27-30 kg/m²
- Placed on a weight-loss intervention consisting of diet and/or exercise until a BMI <25 was achieved
- Fat distribution was measured with computed tomography, and body composition with dual-energy X-ray absorptiometry.
- Serum concentrations of tumor necrosis factor-α (TNF-α), soluble TNF receptor-I (sTNFR-I), sTNFR-II, C-reactive protein (CRP), and interleukin-6 (IL-6) were assessed.
- All markers of inflammation decreased following weight loss among NHW, whereas only IL-6 and CRP decreased following weight loss in AA.

Adiponectin and Leptin in African-American versus Non-Hispanic White Pre-menopausal Women

Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls

**TABLE 1.** Descriptive statistics at baseline and ages of menarche and adrenarche for all children combined and by race

<table>
<thead>
<tr>
<th></th>
<th>EA (n = 80)</th>
<th>AA (n = 57)</th>
<th>Total (n = 137)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>8.1 ± 1.4</td>
<td>7.9 ± 1.9</td>
<td>8.0 ± 1.6</td>
</tr>
<tr>
<td>Total fat mass (kg)</td>
<td>9.6 ± 5.6</td>
<td>11.0 ± 7.1</td>
<td>10.2 ± 6.3</td>
</tr>
<tr>
<td>Lean tissue mass (kg)</td>
<td>20.0 ± 4.2</td>
<td>20.9 ± 5.8</td>
<td>20.4 ± 4.9</td>
</tr>
<tr>
<td>BMI</td>
<td>22.39 ± 1.0</td>
<td>21.04 ± 0.76</td>
<td>21.78 ± 0.64</td>
</tr>
<tr>
<td>BMI z-score</td>
<td>0.87 ± 0.18</td>
<td>0.84 ± 0.17</td>
<td>0.86 ± 0.12</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>145.25 ± 2.2</td>
<td>146.40 ± 2.6</td>
<td>145.77 ± 1.7</td>
</tr>
<tr>
<td>Fasting insulin (μU/ml)</td>
<td>10.5 ± 2.2</td>
<td>15.4 ± 9.0 *</td>
<td>12.4 ± 8.3</td>
</tr>
<tr>
<td>SI (× 10⁻⁴ min⁻¹/(μU/ml)</td>
<td>5.65 ± 1.4</td>
<td>3.42 ± 0.51</td>
<td>4.46 ± 0.75</td>
</tr>
<tr>
<td>AIRg (μU/ml × 10 min)</td>
<td>732 ± 346 a</td>
<td>1639 ± 361 b</td>
<td>1216 ± 654</td>
</tr>
<tr>
<td>E2 (pg/ml)</td>
<td>2.1 ± 6.2</td>
<td>3.8 ± 4.0</td>
<td>2.8 ± 5.3</td>
</tr>
<tr>
<td>Age at menarche (yr)</td>
<td>11.2 a</td>
<td>10.7 b</td>
<td>11.6</td>
</tr>
<tr>
<td>Age at adrenarche (yr)</td>
<td>9.3 a</td>
<td>8.5 b</td>
<td>9.1</td>
</tr>
</tbody>
</table>

*Means with different superscripts are significantly different (P < 0.05).

*Adjusted for age, race, body composition, E2, and AIRg.
Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls

FIG. 1. Comparison by age for A1Rg in AA (■) and EA (▲) girls. Multivariate linear regression modeling indicated significant age (P < 0.001) and race (P < 0.001) effects. Error bars, SEM. **, P < 0.01; ***, P < 0.001.

FIG. 2. Comparison in serum E2 concentration by age in AA (■) and EA (▲) girls. Multivariate linear regression modeling indicated significant age (P < 0.001) and race (P < 0.05) effects as well as age by race interaction (P < 0.001). Error bars, SEM. *, P < 0.05; **, P < 0.01; ***, P < 0.001.

Insulin, Estrogen, and Fat Mass in African-American vs. European American adolescent girls

FIG. 3. Racial differences in progression through puberty in AA (■) and EA (▲) girls. Error bars, SEM. *, p < 0.05.

FIG. 4. Comparison between increase in percent fat before and after menarche in AA (shaded bars) and EA (unshaded bars) girls.

Regulation of Food Intake

http://www.cellbiol.net/ste/alpobesity2.php
Regulation of Food Intake
BDNF Regulation and Obesity

Genome-wide analysis-African-specific variant in SEMA4D associated with body mass index

Women with Lower Income have Higher Obesity in the US

Ogden CL et al. NCHS Data Brief 2010
Non-Hispanic Black and Mexican American Men have Higher Obesity Rates at Higher Income Levels

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Low Income</th>
<th>Middle Income</th>
<th>High Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>32%</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>29%</td>
<td>36%</td>
<td>45%</td>
</tr>
<tr>
<td>Mexican American</td>
<td>30%</td>
<td>31%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Ogden CL et al. NCHS Data Brief 2010
Ethnic Minorities are Less Commonly Diagnosed with Overweight and Obesity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Odd Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>1.0</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>0.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.7</td>
</tr>
</tbody>
</table>

NHANES 1999-2004 for Persons with BMI>30

Davis NJ et al. Obesity 2009
In some studies, Ethnic Minorities have Smaller Response to Weight Loss Pharmacotherapy

<table>
<thead>
<tr>
<th></th>
<th>Sibutramine</th>
<th>Orlistat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic Whites</td>
<td>-4.4kg</td>
<td>-2.8 kg</td>
</tr>
<tr>
<td>Ethnic Minorities</td>
<td>-2.7 kg</td>
<td>-2.3 kg</td>
</tr>
</tbody>
</table>

Osei-Assibey et al. Diabetes, Obesity, and Metabolism 2011
There is Minimal Ethnic/ Racial Difference in Pharmacotherapy Response to Liraglutide

There is Minimal Ethnic/Racial Difference in Pharmacotherapy Response to Liraglutide.

African-Americans Achieve Less Weight Loss After Bariatric Surgery

Mean Absolute Difference in Estimated Weight Loss in Caucasians versus African-Americans

-8.4%

% Estimated Weight Loss

Admiraal WM et al. Diabetes Care 2012
Potential Reasons for Ethnic Disparities in Obesity

- ↑↑ Energy Intake
- ↓ Energy Expenditure
- ↑↑ Life Stressors
  - Racism
  - Lack of Career Options
  - Family Illness/Death

- Cultural Influences
- Genetics

Johnston DW et al. Demography 2011
Johnson P et al. ABNF 2012
Factors which affect access to weight loss surgery

- Race
- Age
- Sex
- SES
- Location
- Referral

Jackson et al. Systematic Reviews 2014, 3:15
Access to RYGB in the United States

108,333 patients
- 79% white
- 12% black
- 9% Hispanic

Black patients
- Higher BMI
- More likely to have HTN

Serious Adverse Events
- Higher in Blacks (3.65%)
- Hispanics (3.19%)
- Whites (2.01%)

Are minorities less likely to proceed with weight loss surgery?

- 651 patients at 2 academic medical centers in Boston
- Evaluated whether racial and ethnic minorities were less likely to proceed with weight loss surgery
- Once referred, racial and ethnic minorities just as likely to proceed with surgery as their non-white counterparts
- Comorbid illness burden was similar, but there was a difference in baseline BMI

Stanford FC et al. Surgical Endoscopy 2015
What accounts for difference in response from weight loss surgery?

- Demographics
- Clinical (BMI, comorbidities, QOL)
- Behavioral (Eating, PA, ETOH intake)

Wee CC et al. Obesity Surgery 2017
Adjustment of BMI Scale for Race, Gender, and Obesity Related Diseases

<table>
<thead>
<tr>
<th>Obesity Co-morbidity</th>
<th>Men (BMI kg/m²)</th>
<th>Women (BMI kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black</td>
<td>Hispanic</td>
</tr>
<tr>
<td>Hypertension</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Diabetes</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>≥2 risk factors</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Average</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

BMI = body mass index; ROC = receiver operating characteristic.
Case #1

- 27 year old African-American woman

**Past medical history:**
- Mixed Anxiety and Depression
- Hyperinsulinsim
- Depression
- Hypertension
- Asthma

**Diet:**
- Breakfast: Oatmeal (weight controlled)
- Snack: Denies
- Lunch: Chicken, Sausage
- Snack: Fruit Cup
- Dinner: Chicken, Sausage with vegetables
- Snack: Rare (Fruit Cup)

**Exercise:** 4 T/TH- gym (elliptical (50 min)); treadmill (60 min)); Fri (treadmill- 60 min)

**Sleep:** 6-7 hours (feels well rested)

**Stress:** Moderate

Strong Family History of Severe Obesity (Mother, 2 Aunts, and 1st Cousin- underwent RYGB with variable response
27 year old woman

BMI: 54
80% EBWL
42.7% TBWL
Vertical Sleeve Gastrectomy

BMI: 30
Case #2

- **58 year old African-American woman**
- **Past medical history:**
  - Hypertension
  - GERD
  - Depression
- **Diet:**
  - Breakfast: Scrambled eggs with spinach, onions, peppers, or sausage; OR Oatmeal with nuts/ blueberries/ blackberries
  - Snack: Fruit; Protein Bar (KIND bars of Jif creamy peanut butter)
  - Lunch: Leftovers (Baked chicken, vegetables, brown rice)
  - Snack: Almonds, Protein Bar
  - Dinner: Baked chicken, vegetables, brown rice
- **Exercise:** 4 days a week (1 hour); 2 days of cardio; 2 days of strength (meets with trainer twice a week)
- **Sleep:** 6-7 hours (feels well rested)
- **Stress:** Normal
- **Post partum weight retention; Night Shift Nurse for 4 years**
58 year old woman

BMI: 34

82% EBWL/
22% TBWL

Phentermine
+Topiramate
Case #3

- **49 year old Hispanic woman**
- **Past medical history:**
  - Anxiety/Depression
  - Ventricular tachycardia s/p ablation
  - Mixed connective tissue disease
  - Hypertension
  - GERD
- **Diet:**
  - Breakfast: Fruit, Vitamins
  - Snack: Vitamin Water, Sobe Life Water, Fruit
  - Lunch: Lettuce (romaine and iceberg); cheese; ham, tomato, peppers, lite Italian dressing, OR vinegar/oil
  - Snack: Fruit (sometimes)
  - Dinner: Spinach, Smart Ones
  - Snack: Denies
- **Exercise:** Walking, some form of cardio, Walks 5 miles a day, Goes to Planet Fitness (Elliptical); Zumba (1 times per day; 7 days a week)
- Weight gain became prominent after childbirth (10 lbs. with each pregnancy X6); tobacco cessation, with metoprolol
49 year old woman

BMI: 52
87.3% EBWL, 45% TBWL
BMI: 26.5

Behavioral VSG

150 lbs (BMI of 25)
BMI 26.5
Case #4

- 67 year old African-American woman

- **Past medical history:**
  - Type 2 Diabetes Mellitus
  - Hypertension
  - CAD
  - CHF
  - NASH
  - Breast Cancer
  - GERD

- **Diet:**
  - Breakfast: Regular Yogurt with Fruit (may snack)
  - Snack: Occasionally popcorn
  - Lunch: Chicken or Fish with vegetables and/or fruit
  - Snack: Fruit (apple, oranges, and watermelon)
  - Dinner: Fish (Haddock, Tilapia) or Chicken with occasional vegetables
  - Snack: Nuts

- **Exercise:** Walking, some form of cardio; 1/2 hour per day; joined a gym (started on the treadmill)

- Weight gain became prominent in peri-menopause
67 year old woman s/p VSG

BMI: 40

67 year old woman s/p VSG

BMI: 23.5

109% EBWL/45% TBWL

159 lbs (BMI of 25)
30 year old woman s/p RYGB

- BMI: 48.5
- BMI: 28
- BMI: 32

86% EBWL/41.5% TBWL

Bupropion/Naltrexone
45 year old woman s/p VSG

BMI: 58
24% EBWL/14% TBWL

BMI: 50

BMI: 38

BMI: 50

Phentermine/Zonisamide
59% EBWL/34% TBWL
59 year old woman s/p RYGB

BMI: 42
BMI: 38
BMI: 26.5
BMI: 35% TBWL
BMI: 25
BMI: 89% EBWL/

Bupropion/
Zonisamide/
Metformin

91% EBWL/

89% EBWL/
34.7% TBWL
Summary

- Obesity is a Multi-factorial disease process
- Regulation of food intake is complex
- ↑ Prevalence of Obesity in Ethnic Minorities
- Persons vary with response to education level and obesity
- Health Care Providers are less likely to diagnose ethnic minorities with overweight/obesity
- Ethnic minorities have less pronounced response to weight loss surgery and pharmacotherapy
Action Items

- Steps should be taken to ascertain etiology of higher prevalence of obesity in ethnic minorities
- Health care providers should be more vigilant about giving appropriate diagnosis of overweight/obesity in ethnic minorities
- Strategies should be employed to address disparities in prevention and treatment of obesity in ethnic minorities