Childhood Obesity: One “Root” for Improving Child Wellness

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Interim Associate Dean Academic Affairs
College of Nursing
University of New Mexico
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Questions about obesity?

- What is it?
  - body fat or adipose tissue defines obesity, not weight.

- Does everyone have the same amount of body fat?
  - There are differences of body fat among different races with lower percentage of body fat among Black African children and a higher percentage of fat among some Asian and Hispanic races (compared to Caucasians). Sweeting, 2007
Questions About Obesity?

So how is obesity measured?

- Density-based
- Scanning
- Bioelectrical impedance
- Anthropometric

TOO COMPLEX, EXPENSIVE or TIME CONSUMING!
What is the difference between Overweight & Obesity in Children?

- Body mass Index (BMI) – weight in kilograms divided by height in meters squared

- For children BMI measurements are plotted on a BMI percentile chart.

- BMI at the 85th to < 95th percentile = overweight
- BMI > 95th percentile = obese
- All values standardized for age and sex

Centers for Disease Control and Prevention. (2009a)
Advantages of BMI-for-Age

• Tracks childhood overweight into adulthood
• BMI-for-age relates to health risks
  - Correlates with clinical risk factors for cardiovascular disease including hyperlipidemia, elevated insulin, and high blood pressure
  - BMI-for-age during pubescence is related to lipid levels and high blood pressure in middle age
Problems with BMI

- National Health and Nutrition Examination Survey (NHANES) data basis for BMI cutoff points.
- BMI does not directly measure body fat.
- Cut off points developed for determining obesity levels in children.
- Cut off points developed for overweight – excess of weight in relation to height.
Three Cases – Meet Definition for Obesity?

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Prevalence

- Obesity & overweight prevalence rates for children in the US, 2-19 yrs. (Ogden, et al., 2014)
  - 16.9% obese
  - 31.8% overweight

- Minority children have even higher rates (Ogden, et al., 2014)
  - 28.5% white children overweight/obese
  - 35.2% for Non-Hispanic Blacks
  - 38.9% for Hispanics
  - Prevalence of obesity alone expected to increase to 30% for all children with Hispanic boys and Black adolescent girls a full 10% higher (Wang, et al., 2012)

Native American rates vary among tribes; estimates as high as 39% for boys an 40% for girls (Story, et al., 2003).
New Mexico Statistics

- Overweight & obesity combined
  - 8,167 kindergarten and third grade students measured in 63 randomly selected schools in NM
  - Kindergarten
    - One-in-four (25.6%) (down from 30.3% in 2010)
  - Third graders
    - One-in-three (34.4%) either overweight or obese

American Indian – 50.4%
Hispanic – 36.4%

New Mexico Childhood Obesity Update: 2015
http://nmhealth.org/data/view/chronic/1861/
WHY THE CONCERN?
Consequences of Obesity

- Coronary Heart Disease
- Type 2 Diabetes
- Hypertension
- Dyslipidemia
- Stroke
- Liver & gallbladder disease
- Sleep apnea
- Osteoarthritis

- Selected cancers
  - Endometrial
  - Breast
  - Colon

- Selected GYN problems
  - Abnormal menses
  - Infertility

CDC, 2009b
### Three Cases – History and PE

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<td><strong>Therese Jaramillo – 15 yr.</strong></td>
<td><strong>Katie Smith – 10 yr.</strong></td>
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<td>No complaints</td>
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Three Cases – Laboratory Evaluation

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<td>Initially only lab drawn was a random insulin = 203 (6-27nl)</td>
<td>Fasting Labs</td>
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<tr>
<td></td>
<td>Total Cholesterol=152 (&lt;200)</td>
<td>Total Cholesterol=124</td>
</tr>
<tr>
<td></td>
<td>HDL=47 (&gt;40); LDL=85 (&lt;100)</td>
<td>Hdl=34</td>
</tr>
<tr>
<td></td>
<td>Triglycerides=100 (&lt;110)</td>
<td>LDL=112</td>
</tr>
<tr>
<td></td>
<td>Fasting glucose=87 (60-115)</td>
<td>Triglycerides=63</td>
</tr>
<tr>
<td></td>
<td>2 hr. PP glucose=89 (60-126)</td>
<td>Fasting glucose=79</td>
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<td>2 hr. PP insulin=74 96-27</td>
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- Total Cholesterol: The normal range is 150-190 mg/dL. Jay's level is slightly high at 152 mg/dL. Therese's level is 187 mg/dL, and Katie's level is 124 mg/dL.
- HDL: The normal range is 40-150 mg/dL. Jay's level is 47 mg/dL, which is below the ideal range. Therese's level is 42 mg/dL, which is borderline. Katie's level is 34 mg/dL, which is low.
- LDL: The normal range is 100-130 mg/dL. Jay's level is 85 mg/dL, which is within the normal range. Therese's level is 112 mg/dL, which is high. Katie's level is 112 mg/dL, which is also high.
- Triglycerides: The normal range is 50-150 mg/dL. Jay's level is 100 mg/dL, which is in the normal range. Therese's level is 166 mg/dL, which is high. Katie's level is 63 mg/dL, which is normal.
- Fasting glucose: The normal range is 60-110 mg/dL. Jay's level is 87 mg/dL, which is within the normal range. Therese's level is 89 mg/dL, which is high. Katie's level is 79 mg/dL, which is within the normal range.
- 2 hr. PP glucose: The normal range is 70-120 mg/dL. Jay's level is 89 mg/dL, which is high. Therese's level is 99 mg/dL, which is high. Katie's level is 92 mg/dL, which is high.
- Fasting Insulin: The normal range is 5-20 mU/L. Jay's level is 15 mU/L, which is within the normal range. Therese's level is 74 mU/L, which is high. Katie's level is 21 mU/L, which is within the normal range.
- 2 hr. PP Insulin: The normal range is 40-120 mU/L. Jay's level is 74 96-27 mU/L, which is high. Therese's level is 229 mU/L, which is high. Katie's level is 185 mU/L, which is high.
A word about…
Non-Alcoholic Fatty Liver Disease

- Incidence in children
  - 22% in obese school-based population
  - Up to 52% in those referred to obesity centers

- Treatment
  - Lifestyle intervention
  - No pharmacological intervention approved for NAFLD

(Koot, et al., 2016)
What works in terms of treatment?

- No one “magic bullet” for the treatment of obesity in children.
- Review (Seal & Broom, 2011) external validity of 6 RCTs from a meta-analysis conducted by Luttikuis et al. (2009)
  - Used a specific framework to assess the relevance, applicability, and generalizability of the 6 studies.
What Works in terms of treatment?

Key findings in terms of treatment included:

- Emphasis on healthy eating (↑ fruits, veg.; ↓ high energy-dense foods)
- Increase physical activity
- Include behavioral modification
- Need to encourage family interventions
- Consider drug therapy in combination with behavior modification for teens with BMI >97th %
- Follow-up needs to continue for at least 12 months after the intervention
- Strategies need to be developed to minimize attrition (text messaging; e-mail, etc.)
# Three Cases - Treatment

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C.C. MO brings him in as she wants him checked for diabetes because “he is overweight” and diabetes “runs in the family”.

**TREATMENT**
- Nutrition and exercise advice
- Metformin 500mg daily

C.C. MO requests nutrition and endocrine consult. Encouraged continuation of exercise. Metformin 500mg daily

MO requests nutrition and endocrine consult. Encouraged continuation of exercise. Metformin 500mg daily
Metformin (Fortamet®; Glucophage® XR; Glumetaz®; Riomet®)

**Inhibits gluconeogenesis**

- Approved for use in children 10 and older
- Initial 500mg BID; can increase weekly in increments of 500mg/day
- MAX DOSE = 2000mg/day
- Dosage can be increased for child > 17 years (max dose 2500mg/day)
- Riomet® 500mg/5ml

**Side Effects/Contraindications**

- GI upset – need to take with food; abd. distension, diarrhea
- Flushing/palpatations
- Contraindicated in renal/liver impairment – monitor liver enzymes, folic acid levels, B₁₂ and glucose levels
- Risk of lactic acidosis – usually in someone with renal impairment
## Three Cases – Follow-up

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### Follow-up 2 months
- Has been working out at a gym; sees a personal trainer; exercises with FA; increased fruit, vegetables and water.
- BMI was 27.2 now 25.9 ↓97%

#### Fasting Labs
- Fasting glucose = 91 [87] (60-115)
- 2 hr. PP glucose = 125 [89] (60-126)
- Fasting Insulin = 22 [25] (6-27)
- 2 hr. PP insulin = 150 [74] (96-27)

- HgB A1C = 5.6

### Follow-up 3 months
- Wt: 183.5 ↓4#

#### Fasting Labs
- Total Cholesterol = 240 [187]
- HDL = 36 [42] LDL = 170 [112]
- Triglycerides = 168 [166]
- Fasting glucose = 73 [79]
- Fasting Insulin = 13 [15]
- 2 hr. PP glucose = 83 [77]
- 2 hr. PP Insulin = 95 [229]

### Endocrinologist Recommendations
1. Minimum 1 h; preferably 1.5 hours aerobic exercise daily.
2. Nutrition: breakfast and lunch no more 45 gm of carbohydrate; no sweets or simple sugars, juices; & increase lean protein, vegetables, salad.
3. Stop Metformin – try above changes first.
4. RTV 2 months, repeat blood sugar, get HgbA1c; not making progress re-start Metformin.
The Role of Culture – Child Obesity

- Among African American and Hispanic families being overweight not necessarily associated with being unhealthy.
  - Thinness often associated with poor health.
  - Hispanic mothers believed a little extra weight would help children recover from illness; thin children more likely to develop disease.

Crawford, P.B., et al., 2004
Effective Communication Across Cultures

- Include extended family members in discussions related to child’s health (may not be necessary with older teen).
- Encourage appropriate physical activity.
- Focus on positive health consequences of good nutrition and increased physical activity rather than focusing on child’s WEIGHT.
What works in terms of Prevention?

  - Review of the literature
  - General guidelines
  - Developmental approach
AAP Key Recommendations

- Identification of children at risk.
- Education: healthy nutrition, physical exercise
  - Breast feeding knowledge; healthy food choices; appropriate portion sizes; food label reading
- Behavior Modification – motivational interviewing, self-monitoring
- Managing food and activity environment
- Family based interventions
Framework for Childhood Obesity
World Health Organization - 2016
GET MORE ENERGY!
HEALTHY, STRONG BODIES COME IN ALL SHAPES AND SIZES

play hard
juega con ganas
at least one hour per day

turn it off
apágala
less screen time!
no more than one hour of TV and video games per day

drink water
toma agua
drink less sugar!

eat well
come bien
eat more fruits and vegetables every day!

HOW READY ARE YOU TO GET MORE ENERGY?

1 2 3 4 5 6 7 8 9 10

What would make me more ready?

What might my next steps be?

What is my plan?
“Unless effective population-level interventions to reduce obesity are developed, the steady rise in life expectancy observed in the modern era may soon come to an end and the youth of today may, on average, live less healthy and possibly even shorter lives than their parents. The health and life expectancy of minority populations may be hit hardest by obesity, because within these subgroups, access to health care is limited and childhood and adult obesity has increased the fastest.”

Olshansky, S. J., et.al. (2005)
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