Obesity and Asthma
Big Sky Pulmonary Conference

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Objectives
- Define obesity for adults and children
- Recognize the relationship between asthma and obesity
- Identify barriers to weight loss and potential opportunities for education

“Remember when we used to have to fatten the kids up first?”
What is Obesity?

- Obesity is defined as “very fat or overweight; corpulent”
- Corpulent = “large or bulky of body; portly; stout; fat”
- Fat = “having too much flabby tissue; corpulent; obese”

Definition of Childhood Obesity

- A child who has a BMI at or above the 85th percentile and lower than the 95th percentile is considered overweight.
- A child who has a BMI at or above the 95th percentile for children of the same age and sex is considered obese.

How to Calculate Pediatric Percentage

- \((\text{Weight in pounds}) / \text{height in inches} / \text{height in inches} \times 703 = \text{BMI}\)

Example
- Wt 70 pounds
- Ht 46 inches
- Female, Age 6 6/12 years
- \(70/46/46 \times 703 = \text{BMI}\)
- \(1.52/ 46 \times 703 = .033 \times 703 = 23.2 \text{BMI}\)
In Children-You Can’t Tell by Just Looking

- Acceptable BMI %iles change during growth
- For pediatrics you always have to determine the BMI then determine the current percentile to know how to classify

BMI 23.2
Age 6 6/12 yrs
Definition of Adult Obesity

- Below 18.5: Underweight
- 18.5 - 24.9: Normal
- 25 - 29.9: Overweight
- 30 and above: Obese

How to Calculate BMI

- \[
\frac{\text{Weight in pounds}}{\text{height in inches}} \times 703 = \text{BMI}
\]
- METRIC: \[
\frac{\text{Wt kg}}{\text{ht cm}} \times 10,000 = \text{BMI}
\]
- Example:
  - Wt. 257 pounds
  - Ht 5 ft 10 inches (70 inches)
  - \[(\frac{257}{70}) \times 703 = (257/4900) \times 703 =
    \]
  - \[.052 \times 703 = 36.5 = \text{BMI}\]
Clinical Clues

- Visual (waist circumference)
  - Not easy with pediatric patients!
- BMI
  - Must calculate %ile in peds
- Acanthosis nigra
- Presence of co-morbid conditions
Asthma and Obesity

- Both asthma and obesity are on the rise
  - Weight gain can precede the development of asthma or poorly controlled asthma can lead to obesity
  - Increase of 1 point in BMI relates to 6% increase in prevalence of asthma
  - Weight loss can improve asthma control


Asthma and Obesity

- Altered respiratory physiology in obesity
  - NiOx was increased in asthmatics, obese non-asthmatics and obese asthmatics
  - Increased inflammation due to obesity
    - P2 protein helps fat cells store fat molecules also inflames cells lining the surface of the airways *
  - Adults with asthma has major reductions in asthma symptoms and need for asthma medications following weight loss via lap band surgery


Association between obesity and asthma: NHANES III

VonMutius Thorax 56;835,2001
The Theories

- Genetics: thrifty gene
- Weight set-point
- Low metabolism
- Food-rich environment
- Sedentary lifestyle
- Too busy to cook healthy
- Low income lack of access
- Lack of knowledge of how to make healthy choices

Possible Mechanisms for Association of Obesity and Asthma

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Risk Factors

- Mother’s pre-conception weight and weight gain during pregnancy
- Very high birth weight AND very low birth weight are associated with childhood obesity
- Maternal smoking during early pregnancy is associated with a 500% greater risk of obesity at age 5
Mediating Factors

- Breastfeeding reduces the risk of obesity
  - 4% decrease for every month of breast feeding
  - Plateaus at 9 months
- Strongest effects of obesity reducing benefits of breastfeeding are seen in adolescents
- Early introduction of solids (before 6 months) increases risk of obesity in childhood

Other Issues Related to Asthma

- Reduced physical activity due to poorly controlled asthma resulting in
- Increased screen time
- Effects of asthma medications on weight – effects of oral and inhaled corticosteroids

The Problem

- About half of parents with an overweight or obese child do not think their kids are too heavy
- About 14% of parents see their normal weight children as underweight
- Parents of children ages 2-5 are more likely to underestimate their child’s weight
- Parents are less accurate in judging the size of their sons
Obesity: Why Now?
- Genetics
- Lifestyle changes:
  - Increased calorie intake poor expenditure
  - Costs and quality of food
  - Portion size - Energy Dense Foods more plentiful
- Diet in school
  - In past, 70% of Dallas schools with over 1000 students have multiple vending machines
  - 75% of beverages and 85% of snacks sold in US middle and high school are of poor nutritional value
  - In Feb 2011, Healthy, Hunger-Free Kids Act increases access to healthy foods for low income children and allows FDA to regulate vending machines
  - It is estimated that 26-39,000 vending machines operate in Texas schools
- Visit www.nutri-cafe.com
- Fast food

Implications as a Nation
- In 2010, 12 states have obesity rates over 30%
  - 20 years ago, no state had an obesity rate above 15%
- Obesity is the #2 cause of preventable death in the US
- Obesity contributes to 300,000 deaths per year
- Obesity related health costs exceed $100 billion annually
- 35% of children are overweight (BMI>85%); 11% with BMI > 95……an increase of 30% in past 10 years
- Childhood obesity is leading nutritional disorder in children
- Childhood obesity predicts adult obesity

Changes over 20 years
- 333 calories
- 590 calories
- 140 calories
- 330 calories
- 210 calories
- 610 calories

http://hin.hhbli.nih.gov/portion/portion.cgi?action=question&number=1
Diet Trends

Sugar Intake 1970 vs 2007

Screen Time
- Children 8—18 years of age spend an average of 7.5 hours a day using entertainment media, including TV, computers, video games, cell phones, and movies.
- 4.5 of those hours are contributed to TV viewing.
Potential Co-morbid Conditions

- Type II Diabetes
- Cardiovascular diseases
  - Hypertension
  - Heart disease
  - Stroke
- Joint problems
- Cancer
- Asthma

He’s Just Big Boned

Vitamin D and Obesity

- In 118 obese adults, Vitamin D insufficiency was found in 90% of the population.
- Serum 25-(OH)D3 levels were significantly lower in the obesity group of children compared to the normal weight control group.
Vitamin D and Obesity

- Obesity-associated vitamin D insufficiency is likely due to the decreased bioavailability of vitamin D3 from cutaneous and dietary sources because of its deposition in body fat compartments.


Regional Differences in Epinephrine Auto-injector Usage


Vitamin D and Asthma

- Vitamin D levels reduced in many asthmatics
- Vitamin D appears to have effect on inflammation
- Low Vitamin D might increase inflammatory response in asthmatics
- Vitamin D also seems to reduce asthma exacerbation and increase the response to glucocorticoids
Vitamin D and Asthma

- Increased IgE can cause increased asthma symptoms and inflammation
- Vitamin D blocks the formation of ε (epsilon) germline transcript
- ε germline transcript is required for immunoglobulin E (IgE)
- Low vitamin D might increase the amount of IgE produced by allergic individuals

What should you measure for Vitamin D?

- Serum 25(OH)D is the barometer for vitamin D status
- Serum 1,25(OH)2D provides no information about vitamin D status and is often normal or even elevated due to secondary hyperparathyroidism associated with vitamin D deficiency
- Most experts agree that 25(OH)D of < 20 ng/ml is considered to be vitamin D deficiency, 21-29 ng/ml is considered to be insufficient
- The goal should be to maintain both children and adults at a level > 30 ng/ml to take full advantage of all the health benefits that vitamin D provides

Labs

- HgA1c and fasting blood sugar
- Insulin level
- Total cholesterol, HDL, LDL, triglycerides
- TSH
- ALT and AST
- BUN
- Creatinine
- Vit D 25 hydroxy
Where do you start?

- Is the child/family concerned about the child’s weight?
- Readiness to change critical
- Even if not ready to change, the issue needs to be addressed
- Should be discussed at every encounter
- Opens the door for the child

Who, what, where, when and how?

- Who purchases the food, prepares the food, eats with the child, etc
- What do they eat and HOW MUCH
- Where are meals eaten
- When are meals served
- How does eating affect them, what motivates them to eat

Be Specific

- How much juice, sugared drinks, sports drinks
- What type of milk is used
- What is the perception of health, healthy eating
- Where is the nearest grocery store, fast food restaurant
- Is the neighborhood safe
Energy Balance

Recommendations

- Define portion size
- How to read labels
- Importance of fiber
- Family effort
- Reduce screen time - goal is one hour per day but we settle for 2
- Increase activity - goal is 1 hour per day

www.choosemyplate.gov
Barriers to Exercise

- Unsafe environments
- No parental supervision
- Poor motivation
- Schedules
- No encouragement
Home Gym
- Milk jugs, canned foods
- Resistance bands
- Zumba
- Heavyweight yoga
- Exercise during commercials

RECOMMENDATIONS
- Guardians are motivated to be good role models
- Buy more healthy options
- Instill structure regarding meal times/food choices/TV
- Positive relationships at home
- Healthy eating for family unit
- Use TV/video games as a reward to exercise/physical activity
- Eliminate eating when children are bored

Summary
- Causal link between asthma and obesity not definite
- Strong association cannot be ignored
- Difficult to control asthma can be influenced by obesity
- Other co-morbid conditions to both diseases should be considered
- As Health Care Professionals we should promote good health