



Obesity and Asthma

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Disclosures

- None

Objectives

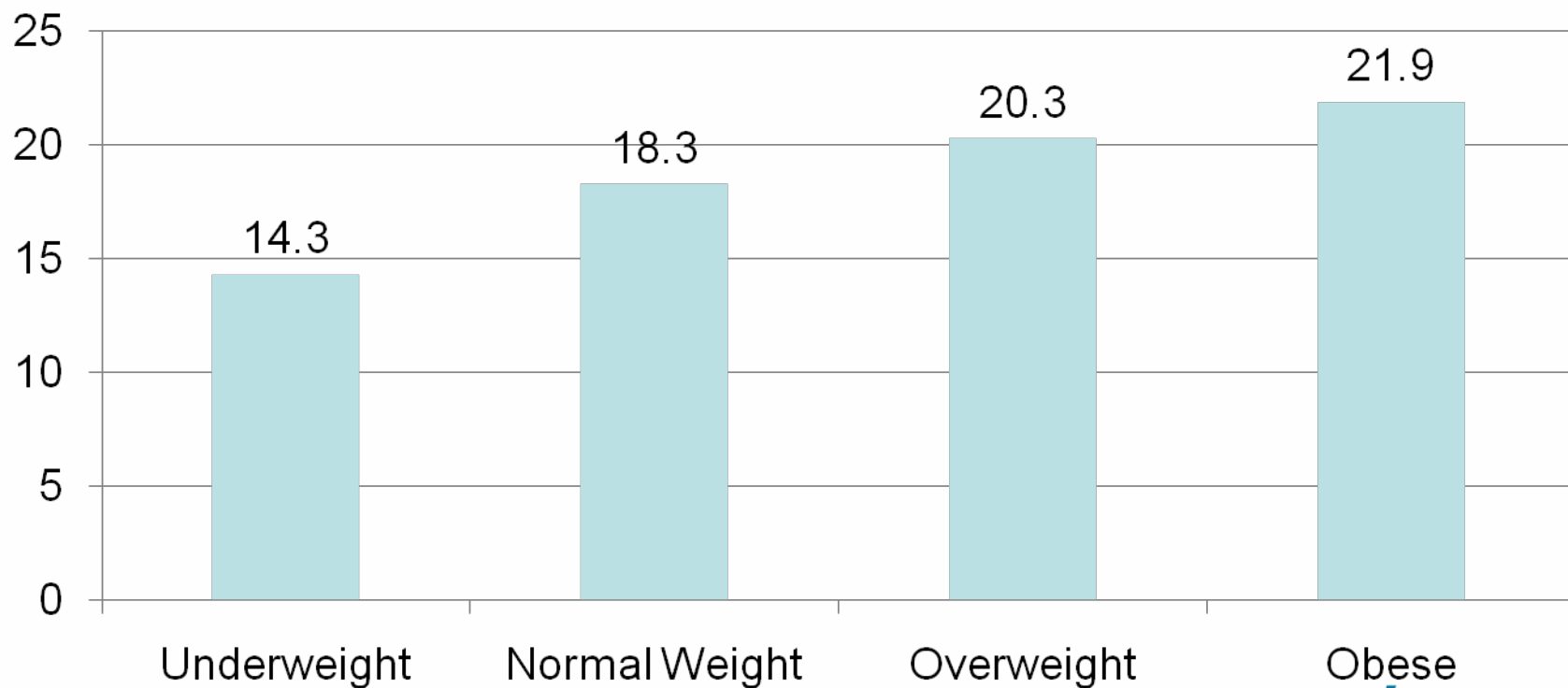
1. Discuss the evidence regarding an association between obesity and asthma
2. Review the current evidence regarding the potential for improving asthma control by reducing weight
3. Understand the confounding factors related to research on the association between asthma and obesity

Dual Epidemics

- US: 1960 – 2002
 - Obese men (20-74 yrs/old): 13.4% - 27.6%
 - Obese women (20-74 yrs/old): 15.8% - 33.2%
- US: 1980 – 1996
 - Self reported asthma increased 73.9%

California Healthy Kids Survey (CHKS)

% Asthmatic



Possible Mechanisms linking Obesity and Asthma

- Mechanical limitations
 - Gastro-esophageal reflux
- Immune modification
 - TNF-alpha
 - IL-1-beta
 - IL-6
 - Leptin
- Diet
- Physical Activity
- Medication effects
- Genetic effects
- Other factors...

Chicken or the Egg?

- If there is an association between obesity and asthma, which comes first?
 - Do asthmatic kids not exercise and become obese OR
 - Is there something about obese kids that causes them to have an increased likelihood of asthma, OR
 - Is there a joint underlying cause or association?

Is Exercise a Factor?

- Sedentary people who decrease their activity:
 - Increase their chance of asthma development
 - Gain weight if they don't decrease consumption
 - Are these true? Are they related?
- 3 prospective studies looking at the effect of physical activity on incidence of asthma
 - 2 show no relationship
 - 1 inversely significant in men, not women

See references 3, 4 and 5

Is the causative agent Diet?

- Differential intake of various foods or nutrients may lead simultaneously to obesity and asthma
 - A number of studies review aspects of this:
 - Causal or artificial association?
- Studies of caloric intake between asthmatics and nonasthmatics show no significant difference.

Changes in Diet

- Decrease in “good” foods
 - Primarily antioxidants
 - N-3 polyunsaturated fat from oily fish
 - Vitamins C, E, A
 - Selenium (from plants)
 - Fruit and vegetables
- Increase in “bad” foods
 - N-6 polyunsaturated fat from margarine and vegetable oils (linoleic acid, converted into arachidonic acid)
 - Actual effects of lipids are complex and currently unpredictable
- May be most important during childhood when airways are growing and during pregnancy

Burger Revolution or Revolting Burgers?

- In a study that controlled for obesity, but not for factors such as socio-economic, lifestyle, or educational factors, a New Zealand study found an association between hamburger consumption and asthma.

K. Wickens, D. Barry et al. Fast Foods – are they a risk factor for asthma? *Allergy* 2005; 60: 1537-1541

Hamburger Dosing Schedule

Multivariate odds ratios (95% confidence intervals) showing associations for food consumption with outcome variables (N=1234)

Hamburger	Wheeze ever	Wheeze last 12 months	Asthma ever	Atopy	BHR to exercise
Never	1.00	1.00	1.00	1.00	1.00
Less than once per week	1.44* (1.06-1.96)	1.17 (0.80-1.70)	1.25 (0.90-1.72)	1.23 (0.90-1.70)	1.25 (0.70-2.26)
More than once per week	1.65* (1.07-2.52)	1.81* (1.10-2.98)	1.27 (0.82-1.98)	1.04 (0.66-1.61)	1.13 (0.52-2.46)

“Frequent consumption of hamburgers showed a dose-dependent association with asthma symptoms...”

*P<0.05

Other Fast Food Effects

- In the same study
 - “Takeaway” foods were associated with a higher risk of bronchial hyper reactivity, but not asthma.
 - “Fizzy Drinks” consumption was not associated with a statistically significant increase in wheezing.

Antioxidant & Lipid Hypothesis

- Complex effect of diet
 - Decreasing antioxidant (fruit and vegetables)
 - Increasing n-6 polyunsaturated fatty acid (PUFA, margarine, vegetable oil)
 - Decreasing n-3 PUFA (oily fish)
- Lead to increased asthma and atopy

Protective Effects?

- Rural Crete
 - Children generally adhere to a “Mediterranean diet”
 - 80% had fresh fruit at least twice a day
 - 68% had fresh vegetables twice a day
 - Overall, consumption of fresh fruit, vegetables and nuts were inversely associated with wheezing

L. Chatzi, G Apostolaki et al. Protective effect of fruits, vegetables and the Mediterranean diet on asthma and allergies among children in Crete. *Thorax*, 2007; 62(8): 677-683

Are asthma medications to blame?

- We use more medications to treat asthma now than in the past
 - The medications may underlie the obesity
- Higher incidence of depression in asthmatics
 - Use of antidepressant medications can lead to weight gain

T Zielinski, E Brown, et al. Depression in asthma: prevalence and clinical implications. Prim Care Companion J Clin Psychiatry, 2000;2:153-8.

Air Pollution and Obesity

- NIH recently awarded a \$1.7 million grant to researchers at The Ohio State University and New York University Langone Medical Center
- Study uses animal models to mimic the development of obesity in humans from childhood to adulthood
- Does particulate air pollution impact the natural balance between the white and brown body fat tissues?

Weight Loss and Asthma

- If obesity causes asthma, does weight loss treat asthma?
 - Helsinki trial: 2 groups of 19 obese patients with asthma
 - Prospective results of 8 week very low energy diet vs normal diet
 - Patients followed for one year

B Stenius-Aarniala, T Poussa, et al Immediate and long term effect of weight reduction in obese people with asthma: randomised controlled study. *BMJ*, 2000;320:827-832

Objective Results

Attribute	Dieters		Controls	
	After 8 week diet	After 1 year	After 8 weeks	After 1 year
Weight Loss	14.5% weight	11.3% weight	0.3% weight	+2.2% weight
Exacerbations		1		4
FEV1	7.3%	4.9%	0.1%	-2.7%
FVC	3.4%	2.0%	-5.2%	-5.6%
PEF	6.1%	5.6%	1.3%	-0.6%

Limitations

- Most adult studies use self reported asthma
 - Some physician diagnosed, not all
- Nearly all studies use body mass index as principal measure

The Association of Asthma and Obesity

- *Is it Real or a Matter of Definition, Presbyterian Minister's Salaries and Earlobe Creases?*
- Concerns regarding 3 main issues:
 - The methods
 - The inherent problems of interpreting statistical “associations”
 - Suspicion of existence of unrecognized cofactors

Wilson, Mark Arch Inten Med. 1999; 159, 2513-4

Interpretation of supposed statistical associations

- 1950's it was noted that there was a close association between salaries for Presbyterian ministers in Massachusetts and the price of rum in Havana.
 - Most likely that both figures grew in tandem simply because of historical and worldwide rise in price of nearly everything.

Unrecognized Cofactor

- In 1984 NEJM published “Ear-canal hair and the ear-lobe crease as predictors for coronary artery disease.”
 - Various physiologic explanations were proposed to account for this association:
 - Extra vascularization, excess of androgens, etc.
 - Both coronary artery disease and earlobe creases are strongly associated with obesity, which may be a more plausible risk factor to explain the association

Wagner RF et al. NEJM. 1984;311:1317-8

Impact on Current Practice

- Excess weight might increase the risk of asthma development:
 - 15-38% of adult asthma may be caused by obesity
 - Prevalence of obesity of 30%
 - Relative risk from 1.6-3.0 ([reference 1](#))
- Weight loss may help decrease asthmatic symptoms
 - We have new options for preventing and treating asthma

Potential for future practice

- Diet and dietary manipulations are a major focus of research.
- It is possible that diet contributes to the development of certain diseases, to include asthma. If this is the case, dietary modification or supplementation may ultimately be used to reduce the risk of these conditions.



**Medical
Center**

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