

Asthma and Obesity

Is there a link?

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Definitions

- Asthma:

Chronic inflammatory disorder of the airways, resulting in variable symptoms of cough, chest tightness, shortness of breath, and/or wheezing

- **Obesity**

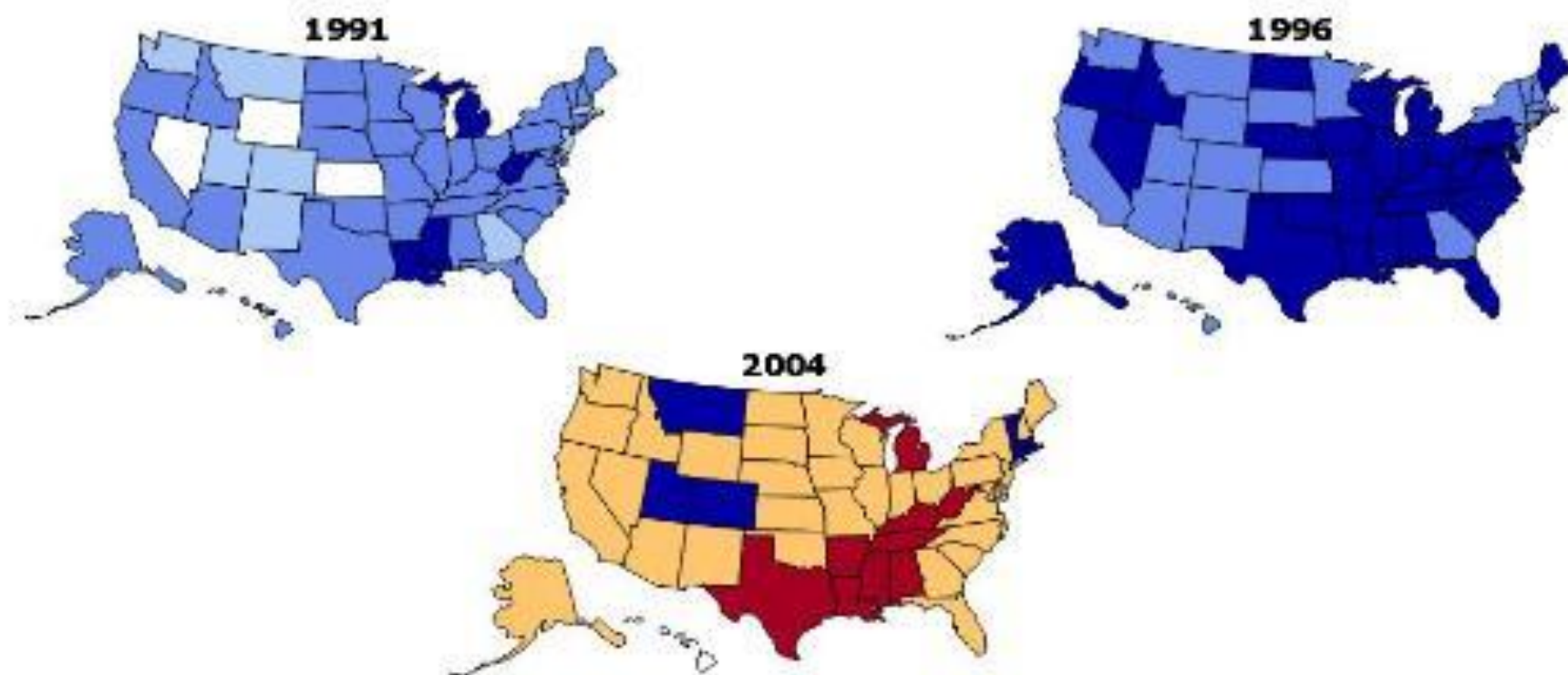
Body Mass Index
KG/M²

<18.5	Underweight
18.5-24.9	Normal
25-29.9	Overweight
30-34.9	Obese
>35	Severe Obesity

Obesity Trends* Among U.S. Adults

BRFSS, 1991, 1996, 2004

(*BMI >30, or about 30 lbs overweight for 5'4" person)



Legend: No Data, <10%, 10%-14%, 15%-19%, 20%-24%, ≥25%



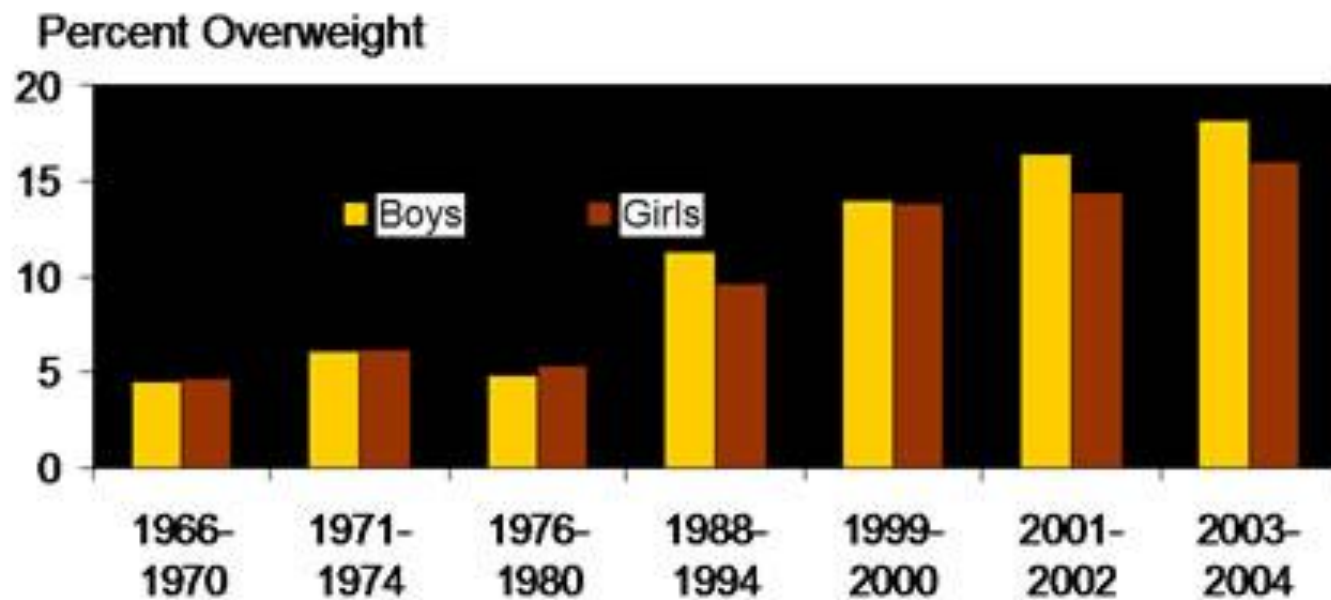
Source: Behavioral Risk Factor Surveillance System, CDC.

2009 State Obesity Rates

State	%	State	%	State	%	State	%
Alabama	31.0	Illinois	26.5	Montana	23.2	Rhode Island	24.6
Alaska	24.8	Indiana	29.5	Nebraska	27.2	South Carolina	29.4
Arizona	25.5	Iowa	27.9	Nevada	25.8	South Dakota	29.6
Arkansas	30.5	Kansas	28.1	New Hampshire	25.7	Tennessee	32.3
California	24.8	Kentucky	31.5	New Jersey	23.3	Texas	28.7
Colorado	18.6	Louisiana	33.0	New Mexico	25.1	Utah	23.5
Connecticut	20.6	Maine	25.8	New York	24.2	Vermont	22.8
Delaware	27.0	Maryland	26.2	North Carolina	29.3	Virginia	25.0
Washington DC	19.7	Massachusetts	21.4	North Dakota	27.9	Washington	26.4
Florida	25.2	Michigan	29.6	Ohio	28.8	West Virginia	31.1
Georgia	27.2	Minnesota	24.6	Oklahoma	31.4	Wisconsin	28.7
Hawaii	22.3	Mississippi	34.4	Oregon	23.0	Wyoming	24.6
Idaho	24.5	Missouri	30.0	Pennsylvania	27.4		

Figure 1.

Childhood Obesity Epidemic



Ogden CL, et al. JAMA 2006; 295:1549-55

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"It's something we think today's kids will be able to relate to - Inaction Figures."

Obesity

- Worldwide obesity has more than doubled since 1980
- In children the prevalence of obesity will double to 30% by 2030.
- CDC reports that 15.6% are at risk for overweight, 32% are overweight, and 17% are obese. (tripled over past 4 decades)
- Adults 65% overweight or obese

WEAPONS OF MASS DESTRUCTION



Asthma

- Self reported prevalence increased 75% from 1980-1994
 - In children 0-4 years old, the prevalence increased 160%
 - In the 5-14 year old group, the prevalence increased 74%

Epidemiological studies

Cross sectional studies have found an increase in the prevalence of asthma among obese patients

Prospective studies (>300,000 patients) show that obesity is a risk factor for the de novo diagnosis of asthma, with the risk increasing between 1.1 to 3 fold

- Norwegian study (135K) over 21 years the incidence of asthma increased 10%males/7%females per unit increase in BMI
- A US study looked at 1000 patients and found a significant association between the percentage of body fat and asthma

Epidemiological studies

- Pediatric studies
 - One study 9828 children 6 to 14 yrs old who were followed for 5 yrs, showed obesity increased the risk of suffering from asthma, girls>boys
 - Another study with 3792 children, boys>girls
 - Another study 4719 children showed obesity at age 14 increased the risk of suffering from asthma at age 31. If obese at both 14 years and 31 years, twice as likely to be asthmatic

Epidemiological studies

- Studies including weight change
 - Nurse Health study- conclusion for those who gained more than 25kg from age 18 years, relative risk of asthma increased by 4.7, compared to those who maintained a steady weight
 - Multiple studies show that weight loss improves asthma
 - A loss of 15% body weight led to better results in FEV1, FVC, lower symptom scores

Hypotheses to Justify Association

- Obesity and lung physiology
- Obesity and inflammatory markers
- Genetic factors
- Hormonal factors

Obesity and Lung Physiology

- Decreased pulmonary compliance from fat compression
- Subjective increases in dyspnea
- Limitations in airflow, measured by pulmonary function testing
- Reduced lung volumes, reduced diameter of peripheral airways-> possible changes in bronchial smooth muscle function

Obesity and Inflammatory Mediators

- Increased adipose tissue leads to increased adipose tissue adipokines, including eotaxin, CRP, leptin, TNF alpha, IL6; decreased levels adiponectin
- Asthma patients have increased levels of TNF alpha, IL6, eotaxin

Genetic Factors

- Specific regions of the human genome are related to both asthma and obesity
 - Chromosome 5 q *ADRB2, NR3C1*
 - Chromosome 6 *TNF alpha*
 - Chromosome 12 q *INF gamma, nitric oxide synthase-1, STAT 6, type 1 insulinoid growth factor*

Hormonal Factors

- Tuscon study found the prevalence of asthma greater in obese girls with early menarche

Conclusions

- Obesity can increase the prevalence and incidence of asthma
- Efficacy of typical anti-inflammatory therapy may be blunted in obese asthmatics
- Treatment plans for obese asthmatics should include a weight control program
- More research is necessary

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“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”



**She went through that new 14-day diet,
but all she lost was two weeks.**