

Obesity and Asthma: Consequences on Asthma Medication Use, Episodes, and Emergency Room Visits

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The “What’s” for This Presentation

- ▶ What has been said about the issue (i.e., obesity and asthma)
- ▶ What does the North Carolina data show (including role of demographic factors)
- ▶ What do the results mean

What the U.S. Surgeon General Said:

- 2001: “...these trends are associated with dramatic increases in conditions such as asthma, and in Type 2 diabetes among children.” [David Satcher, MD]
- 2003: “...excess weight significantly increases our kids’ risk factors for a range of health problems, including diabetes, heart disease, asthma, and emotional and mental health problems.” [Richard Carmona, MD]
- 2008: “ Obesity is associated with a higher prevalence of asthma.” [Office of the Surgeon General]

What the Media and Others Said:

“...Compared to adults with healthy weight (BMI values from 18.5 to 24.9), those with a body mass index of 40 or higher had an increased risk of being diagnosed with ... asthma (2.72 times greater), ...” [CDC, December 31, 2002]

“Evidence is now mounting that obesity is also a risk factor for asthma. Reports have shown that nearly 75 percent of emergency room visits for asthma have been among obese individuals and studies have shown that obesity pre-dates asthma.” [Medical News Today, May 10, 2005]

What the Media and Others Said (Cont.):

“Obesity makes asthma worse: study”

[Reuters web article headline, May 22, 2007]

“Are epidemics in asthma and obesity linked?”

[Daily Mail article headline, September 17, 2007]

“Weight gain may make asthma control more difficult”

[Reuters web article headline, November 12, 2007]

“Asthma and Obesity: A Losing Combination”

[HealthCentral.com article headline, March 5, 2008]

What the Researchers Said:

► No lack for studies:



192 Periodical Search Results You searched for "asthma" AND "obesity" within Journal of Allergy and Clinical Immunology [New Search](#) | [Edit Search](#) | [Save Search](#) | [Save Search as an E-mail Alert](#)

Viewing 1-20 of 192 results [Next 20>](#) Results Page: [1] [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [>](#)
Display:

- Continuing Medical Education examination: The epidemiology of obesity and asthma
The Journal of Allergy and Clinical Immunology
May 2005 (Vol. 115, Issue 5, Page 910)
[Full-Text PDF \(31 KB\)](#)
- Reduced FEV1/FVC in obese versus normal weight children with asthma
S.R. Roy, A.B. Yates, J.E. Moffitt, G.D. Marshall
The Journal of Allergy and Clinical Immunology
February 2005 (Vol. 115, Issue 2, Page S228)
[Full Text](#) | [Full-Text PDF \(33 KB\)](#)

What the Epidemiologists Said:

- ▶ “Overweight and obesity are associated with a dose-dependent increase in the odds of incident asthma in men and women, suggesting asthma incidence could be reduced by interventions targeting overweight and obesity.” [Beuther and Sutherland, 2007]
- ▶ “Although a considerable number of studies using different study designs indicate that excess weight might increase the risk of asthma development, the topic remains controversial because of potential methodological limitations...” [Ford, 2005]

Methodologic Inadequacies

- ▶ **Definitions of asthma:** asthma-like symptoms vs. true asthma
- ▶ **Use of anthropometric measures:** self-reported weight and height
- ▶ **Directionality of causation:** cross-sectional and case-control studies
- ▶ **Diagnostic or detection bias:** asthma diagnosed more frequently among the obese?
- ▶ **Incomplete accounting of confounding:** diet, physical activity, GERD, sleep-disordered breathing

What the Clinicians Said:

- ▶ “...obesity appears to predispose toward airway hyperresponsiveness... obesity-related changes in lung development, chronic systemic inflammation (including increased serum levels of inflammatory cytokines and chemokines)...” [Shore and Fredberg, 2005]
- ▶ “...therapeutic responses to montelukast appeared to increase with increasing BMI... increasing BMI did not confer a similar increase in responsiveness to beclomethasone...” [Golden et al., 2006]

Interpretation(s)

- ▶ **Changes in the blood levels of hormones derived from fat tissue in the obese** may affect the airways
- ▶ **Other adipocyte-derived factors** might alter airway smooth muscle function in such a way as to promote airway narrowing
- ▶ **Asthma in the overweight/obese** may be a more leukotriene-driven form of asthma than in those of normal BMI
- ▶ **Increased asthmatic inflammation that exists in the overweight/obese** may be relatively corticosteroid-resistant

What the NC Asthma Program is Trying to Find Out

- ▶ Is there a relationship between asthma prevalence and obesity?
- ▶ If so, what does this relationship look like with respect to four asthma-related behaviors?

What We Did

▶ Our source of data:

- 2006 North Carolina Behavioral Risk Factor Surveillance System data for adults 18+ years of age with asthma who are obese (n=479) and not obese (n=637)
 - Annual statewide random telephone survey
 - Developed by CDC; currently conducted in all 50 states, DC, 3 territories
 - Wide range of issues on health behavior and preventive health practices related to leading causes of death and disability

What We Did (Cont.)

▶ Our source of data:

- **BMI Calculation:**

- “About how much do you weigh without shoes?”
(pounds/kilograms – fractions rounded up)
- “About how tall are you without shoes?”
(feet & inches/meters & centimeters – fractions rounded down)
- Formula: $[\text{Weight (lb)} / \text{height (in)}^2] \times 703$

What We Did (Cont.)

Body Mass Index Table																																				
	Normal					Overweight					Obese					Extreme Obesity																				
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	Body Weight (pounds)																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.

What We Did (Cont.)

▶ Our source of data:

- **Lifetime asthma:**

“Have you ever been told by a doctor, nurse, or other health professional that you had asthma?”

- **Yes:** 1768 (10.9%)

- **Current asthma:**

“Do you still have asthma?”

- **Yes:** 1178 (6.8%)

What We Did (Cont.)

▶ The variables we were interested in:

- **Asthma episodes:**

“During the past 12 months, have you had an episode of asthma or an asthma attack?”

- **Inhaler use:**

“During the past 30 days, how often did you use a prescription asthma inhaler DURING AN ASTHMA ATTACK to stop it?”

What We Did (Cont.)

▶ The variables we were interested in:

- **Asthma medication use:**

“During the past 30 days, how many days did you take a prescription asthma medication to PREVENT an asthma attack from occurring?”

- **Emergency department (ED) visits:**

“During the past 12 months, how many times did you visit an emergency room or urgent care center because of your asthma?”

How We Analyzed the Data



- ▶ Logistic regression models were used:
 - To determine predictors of ED/urgent care usage, use of prescription asthma medications, and use of asthma inhalers
 - Control for race, gender, and income status

What We Found

BMI*	Lifetime Asthma**		Current Asthma***	
	Yes n=1683	No n=13,171	Yes n=1116	No n=13,714
Recommended Range	9.3%	90.7%	5.2%	94.8%
Overweight	10.0	90.0	5.8	94.2
Obese	14.8	85.2	10.2	89.8

*Recommended Range= BMI 18.5–24.9; Overweight= BMI 25.0-29.9; Obese= BMI >30.0

** $\chi^2 = 38.89$, $p < .0001$

*** $\chi^2 = 58.01$, $p < .0001$

What Else Did We Find?

	No. of Observations	OR Estimate	95% CI	P value
Asthma Episodes	916	1.84	1.27 2.65	.001
Asthma Inhaler Use	901	1.50	1.04 2.18	.031
Rx Asthma Medication Use	913	1.09	0.75 1.60	.647
Emergency Dept. Visits	925	1.69	1.09 2.64	.020

What Does That Mean?



- ▶ Obese asthmatics, when compared with non-obese asthmatics
 - Have to use prescription asthma inhalers more often
 - Have more asthma episodes
 - Have more emergency department visits
 - Are not different in their use of prescription asthma medications

How Do We Interpret These Findings?

- ▶ Study design and data show only relational, not causative results
- ▶ Results do support other study findings
- ▶ Additional data (e.g., specific Rx asthma medications; details re asthma Sx, episodes, etc.) would be helpful
- ▶ Prospective study designs and more precise definitions of variables are needed

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The authors dedicate this presentation in memory of Janet Reaves.

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