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OVERWEIGHT WOMEN AND MANAGEMENT OF ASTHMA

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Purpose. **We sought to describe clinical and psychosocial characteristics of overweight women with asthma.**

Methods. **Telephone interview and medical record review involving 808 women with asthma participating in a randomized study to identify those who were overweight. We assessed the relationship of their weight to asthma symptoms, health care use, quality of life, self-esteem, need for social support, and demographic characteristics. Regression analyses were used to investigate relationships between overweight and asthma.**

Findings. **Sixty-eight percent of the women in the study were overweight or obese. Demographic characteristics associated with overweight in women with asthma included being minority ($p = .000$), having a lower education level ($p = .000$), and a lower household income ($p = .024$). Overweight was associated with greater health care use, comorbidities (acid reflux, urinary incontinence), and persistent disease ($p = .001$). Overweight women exhibited lower self-esteem ($p = .002$) and lower perceived quality of life ($p = .000$).**

Conclusion. **Overweight females with asthma experience significant challenges because of their weight, more persistent and severe disease, specific comorbidities, and lower rates of obtaining psychosocial resources. Clinical consultations and interventions should account for the influence of overweight on asthma control and health status in female patients.**

Introduction

Weight and asthma is a topic increasingly discussed due to the rise of obesity in the United States (Jarvis, Chinn, Potts, & Burney, 2002). Although the natural history of asthma as it relates to weight is not fully understood (Chinn, 2003), the two conditions pose significant public health problems. Prevalence data show that almost twice as many women have asthma compared with their male counterparts (Barnes, Heyman, & Schiller, 2007). Several investigators have shown that women experience more asthma symptoms (Lin & Lee, 2008; McCallister & Mastronarde, 2008), have higher rates of clinical visits, hospital admissions and readmissions for asthma, and have higher rates of asthma-related mortality (Centers for Disease Control and Prevention [CDC], 2004a, Moorman et al., 2007). Women with asthma who are overweight or obese are thought to experience greater problems with the disease than women of average weight (Burgess et al., 2007; Clark et al., 2007).

The interplay of biological sex and weight in the epidemiology and etiology of asthma has been recognized. It is during adolescence and the onset of menses when the prevalence of the condition shifts from predominately impacting the health of young males to a disease of females (Almqvist, Worm, & Leynaert, 2007). Venn, Lewis, Cooper, Hill, and Britton (1998) posit that the tendency for adolescent females to experience weight gain during this time may account for the increases observed in asthma prevalence. Researchers have also found a correlation between higher

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body mass index (BMI) in childhood and the onset of adult asthma in females (but not males; Beckett, Jacobs, Yu, Iribarren, & Williams, 2001; Castro-Rodríguez, Holberg, Morgan, Wright, & Martinez, 2001; Chen, Dales, Krewski, & Breithaupt, 1999). One hypothesis for the relationship between weight, gender, and asthma is the effect of increased estrogen levels associated with obesity on the smooth muscles of the airway and on inflammatory and immune system function (McCallister & Mastronarde, 2008; Weiss & Shore, 2004).

Additional studies have shown that higher BMI is more evident in those with asthma compared with those who have never had the condition (Vortmann & Eisner, 2008; Kim & Camargo, 2003). Obese individuals with asthma may have more airway obstruction than their normal weight counterparts (Thomson, Clark, & Camargo, 2003). Those with asthma who lose weight seem to experience reductions in symptoms and improved airflow (Castro- Rodríguez et al., 2001). The relationship between obesity and asthma may also have both a hormonal and a metabolic component (Real et al., 2007). Recent research has identified the implications of the levels of serum leptin, a hormone produced by adipocytes which is elevated in obese individuals, on asthma (Perfetto et al., 2004; Weiss & Shore, 2004). These findings have prompted researchers to consider the need of different asthma medications for adult based on their weight (Peters-Golden et al., 2006).

Existing research suggests that, although we do not know the exact mechanisms between overweight and the onset or exacerbation of asthma, women who are overweight or obese are likely to have different management challenges than women of average or lower weight. Given the disparities in asthma between men and women, it is important to not only recognize the gender difference, but also to identify and understand the specific asthma management needs of this particular population. Very little is known about the day-to-day asthma management challenges and psychosocial factors facing overweight women. The purpose of this study was to 1) describe a population of overweight women with asthma, 2) better understand the asthma-related difficulties they face, and how these may impact daily asthma management, and 3) identify how educational interventions might be designed and tailored to better manage their asthma.

Methods

Subjects

The study was conducted from baseline data as part of a randomized clinical trial to assess the effects of an intervention for women with asthma (Clark et al. 2007). All study procedures were approved by the University of Michigan Institutional Review Board. Patients of the University of Michigan Health System (UMHS) participated in the study if they met the following criteria: 1) 18 years of age and older; 2) diagnosis of asthma by a UMHS physician; 3) presence of active symptoms in the past 12 months; 4) enrolled in a participating UMHS clinic; 5) no extenuating medical or mental condition to preclude participation; and 6) access to a telephone. Patients from the asthma-related clinics were identified by the physicians and sent a study invitation letter and postcard ($n = 2{,}336$). A total of 1,081 of the women contacted were eligible to participate in the study (met all study criteria and had working phone number) and were sent additional study information and consent forms. Ultimately, 808 (75%) of the women consented and completed the baseline telephone interview. Nonconsent of the eligible participants was attributable primarily to a lack of interest in the study or the perception of not having asthma.

Data collection and measures

Trained and supervised interviewers collected baseline data by telephone. Demographic data (household income, education level, and race/ethnicity) along with weight and height were collected. Data regarding comorbidities and smoking history were also collected. BMI was calculated based on the self-reported weight and height by the participants using the CDC recommended calculation for adults (CDC, 2004b; Kushner & Blatner, 2005). In this study, we used the CDC BMI calculation and the standard weight status categories associated with BMI ranges for adults to classify participants as either normal or overweight and obese.

Asthma-related symptoms. The National Asthma Education and Prevention Program (NAEPP) guidelines were used to classify women's symptoms (Clark et al., 2007; National Asthma Education and Prevention Program, 2007). The frequency of asthma daytime and nighttime symptoms experienced in the past 12 months was collected and used to determine asthma severity classification. A dichotomous variable for categorization of persistent disease was used in the analysis.

Asthma-related health care utilization and limitations. Asthma-related health care utilization was captured for the number of hospitalizations, emergency department (ED) visits, scheduled asthma visits, unscheduled urgent visits, and follow-up visits for an asthma episode to a clinic or doctor's office in the past 12 months. Patient reports of health care utilization were verified through hospital records for the corresponding time periods. Sex and gender-related queries focused on symptoms related to hormonal, pregnancy and menstrual cycle, household-related tasks, and social and sexual activity.

Asthma-related psychosocial factors. Quality of life was measured using the mini Asthma Quality of Life Questionnaire (Juniper, Guyatt, Ferrie, & Griffith, 1993). The 10-item scale captured: 1) activity limitations, 2) asthma symptoms, 3) emotional function, and 4) environmental stimuli. Items related to the level of a woman's self-esteem (Rosenberg, 1986) and the availability and need for asthma-related social support (e.g., transportation to asthma health care appointments and assistance with care needs) were also measured.

Analysis

Statistical analyses included simple frequencies and descriptive statistics of variables of interest. Weight status was our outcome of interest. A dichotomous variable was used to categorize the study sample using CDC BMI standard weight status categories for adults as either overweight and obese (BMI $\geq$ 25) or normal and underweight (BMI $<$ 24.9). Logistic regression was conducted to examine the relationship between weight status and demographic and clinical characteristics and comorbidities. Independent sample *t*-tests were completed to assess differences in health care utilization (hospitalizations and ED use) and symptoms between participants who were categorized as overweight and obese compared with those who were not. A confidence level of 95% was accepted as significant.

Table 1. Baseline Characteristics of the Study Sample

Variable	Total Sample ($N = 808$), %	*p*
Age in years (mean, SD)	48 (13.7)	
Education		$< .05$
Below high school	2	
High school	28	
2-Year college	20	
4-Year college	28	
Postgraduate	22	
Employed full-time or part-time (% Yes)	66	
Household income ($)		
<20,000	12	
20,001–40,000	17	
40,001–60,000	18	
60,001–80,000	15	
80,001–100,000	13	
>100,001	15	
Refused/missing	10	
Marital status (% Married)	63	
Race (% White)	83	
Asthma severity		
Intermittent	52	
Mild persistent	16	
Moderate persistent	19	
Severe persistent	13	
Overweight		
Underweight (BMI < 19)	3	
Normal (BMI 19–24.9)	29	
Overweight (BMI 25–29.9)	26	
Obese (BMI 30–35)	19	
Extremely obese (BMI > 35)	23	
Other chronic health condition(s) (% yes)	58	
Smoking (10-pack/year history) (% yes)	27	

One-way ANOVA and χ^2 tests were performed on demographics and variables of interest.

Results

Table 1 shows demographic data and clinical characteristics of the 808 participating women. The mean age of the study participants was 48 ± 13.7; the majority of women had an educational level of two years of college or greater (70%); 66% were employed and 29% had a household income of $40,000 or less per year. Sixty-three percent of the women were married and 83% were Caucasian. Thirteen percent of the study women had severe persistent asthma and 58% reported one or more chronic health conditions. Forty-five percent of the study women were overweight or obese and 23% were extremely obese.

Women who were overweight or obese were significantly more likely to have hospital admissions and ED visits for asthma than those of lower weight (Table 2). Additionally, women who were overweight or obese had significantly higher rates of unscheduled urgent care visits, regularly scheduled asthma visits, and follow-up visits for an asthma episode compared with their counterparts who were not overweight.

As presented in Table 3, the measures of psychosocial functioning indicate that those who were overweight or obese had statistically significant lower levels of self-esteem and lower quality of life compared with those who are not overweight or obese. Women who were overweight or obese also required significantly higher levels of social support.

Table 4 shows the association of weight and sample characteristics. Study participants who were overweight or obese were more likely to be minority (odds ratio [OR], 3.08; 95% confidence interval [CI], 1.744–5.463); have lower levels of education (OR, 2.136; 95% CI, 1.494–3.055); and have lower household income (<$40,000 per year; OR, 1.823; 95% CI, 1.083–3.066). Furthermore, women who were overweight or obese were much more likely to report problems with acid reflux, which is associated with asthma (OR, 1.983; 95% CI, 1.443–2.725), urinary incontinence (OR, 1.978; 95% CI, 1.452–2.695), and more severe persistent disease (OR, 1.66; 95% CI, 1.223–2.259).

Discussion

Asthma may be more challenging and severe for overweight and obese women than for women who are not overweight. These findings are similar to those of other studies where greater asthma-related risk and higher ED use in populations were evident in overweight or obese patients (Akerman, Calacanis, & Madsen, 2004;

Table 2. Relationship of Overweight/Obesity to Health Care Utilization

Health Care Utilization*	Mean		Mean Difference	95% CI	*p*
	Overweight/Obese	Not Overweight/Obese			
Hospitalization	0.35	0.09	0.26	0.139–0.387	.000
ED visits	0.64	0.28	0.36	0.162–0.556	.000
Unscheduled urgent visits	1.23	0.61	0.62	0.324–0.913	.000
Regularly scheduled visits	2.61	2.00	0.61	0.059–1.153	.030
Visits to follow-up an asthma attack	1.50	0.80	0.70	0.350–1.052	.000

* Reported as number in past 12 months.

Beckett et al., 2001; Chen, Dales, Tang, & Krewski, 2002; Oh, 2008; Thomson et al., 2003; Vortmann & Eisner, 2008). Findings also suggest a number of factors should be considered in clinical counseling or educational interventions when aiming to assist women who are overweight or obese manage their asthma more effectively.

Carefully designed communications for overweight patients that recognize the specific cultural and social influences on their asthma management behaviors may be needed, as are materials and counseling approaches geared to lower education and income levels. Given the asthma disparities in females and the prevalence rates of asthma in underserved minority populations (Apter, 2009; Moorman et al., 2007; Lin & Lee, 2008; McCallister & Mastronarde, 2008), it is necessary that the patient's health literacy be taken into consideration when clinical and educational interventions are designed. The association of greater weight with higher health care utilization rates identified also supports the need for health care that addresses the specific asthma-related risk of those who are overweight or obese. Helping women to recognize that their need for more health care is influenced by their weight may also raise awareness of the connection between weight and adverse asthma outcomes.

Given the possible psychosocial needs of overweight women identified, a greater sensitivity may be required when providing care, advice, or in the design of an asthma management program for the patient who is overweight or obese. It is important to find ways to tailor asthma regimens and clinical advice for women based on their own perceptions of psychosocial needs (quality of life, self-esteem, and social support). Therefore, finding novel strategies to build self-esteem seem warranted, including that respect is evident on the part of the health care provider and that he or she explicitly communicates praise and encouragement for effective management steps undertaken by the patient (Clark et al., 2008). A helpful strategy that may address both lower levels of self-esteem and needs for social support in this population may be to include significant others in the clinical encounter or intervention program. Studies have shown that patients frequently follow the advice of their friends rather than their clinicians (Gallant, 2003). Given the importance of social support to overweight women, finding ways to make allies of these significant others likely deserves attention. Other useful strategies may include recommending therapies and means of administration that are least disruptive to a woman's daily routine, identifying when to use medicines preventively before socializing, and emphasizing the need for continuous use of medicines to reduce interrupted sleep, if sleep disruptions are frequent (Clark et al., 2007). Tailored therapy and advice may increase a women's asthma control self-efficacy (belief in her ability to perform the needed task) and lead to better asthma management and outcomes (e.g., quality of life, health care utilization) (Martin et al., 2009).

The overweight woman is likely to have more severe (persistent) asthma and need to manage multiple conditions and limitations. Programs and counseling that enhance management when there are more frequent symptoms and more complicated medical regimens

Table 3. Relationship of Overweight/Obesity to Psychosocial Factors

Psychosocial Factors	Standardized Coefficients (Beta)	95% CI	*p*
Self-esteem	0.112	0.452–1.999	.002
QOL*	0.173	2.712–6.506	.000
Social support	0.059	−0.127–1.503	.098

Abbreviations: CI, confidence interval; QOL, quality of life.
* A higher quality of life score represents a worse outcome.

Table 4. Relationship of Overweight/Obesity to Sample Characteristics

	OR	95% CI	*p*
Demographic characteristics			
Race (minority)	3.08	1.744–5.463	.000
Education (low)	2.14	1.494–3.055	.000
Household income (<$40,000/year)	1.82	1.083–3.066	.024
Comorbidities and clinical characteristics			
Migraines	1.13	0.830–1.551	.429
Acid reflux	1.98	1.443–2.725	.000
Urinary incontinence	1.98	1.452–2.695	.000
Severity (persistent asthma)	1.66	1.223–2.259	.001

Abbreviations: CI, confidence interval; OR odds ratio.
Logistic regression reported; race, white = 0, minority = 1; education, high = 0, low = 1; household income, high = 0, low = 1.

may be needed to help women to achieve asthma control. Helping women to distinguish the symptoms and the remedies for asthma in contrast to their accompanying conditions may help them to more effectively follow recommended regimens.

There are several limitations that should be noted. The women studied were not selected to be representative of the general population of women with asthma and, as a result, these findings may not be generalizable. However, the study participants are likely not dissimilar to populations seeking service in health care institutions who are willing to take part in asthma research. A strength in this study is the validation of health care utilization reports through the review of medical records, thereby increasing the validity of all reported data. Further, women of color comprised 17% of the sample. Because race/ethnicity was a significant predictor of overweight and associated problems, studies specific to subgroups of minority women should be further explored. Finally, BMI was computed from self-reported height and weight. Persons who are obese tend to underreport their weight (Lawlor, Bedford, Taylor, & Ebrahim, 2002). Underreporting of weight may show weaker associations between asthma and obesity in this study than may actually be evident.

Conclusion

Overweight is a significant problem among women with asthma and they are likely to face not only a greater number of, but more serious, obstacles related to management of their disease. This study points to the need for additional investigation into the clinical and psychosocial challenges facing overweight women attempting to manage asthma. Evaluation of interventions tailored to help overweight women with asthma may also be needed. Consideration of the special challenges evident in these findings should be part of clinical counseling and asthma education programs aimed at helping women who are overweight improve their health status and outcomes.

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