

ORIGINAL ARTICLE

Women and Asthma: Lessons from a Gender Analysis of the Asthma in Canada Survey

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Objective. To compare the degree of asthma control achieved by men and women with asthma in Canada and to explore differences in patient perspectives, treatments used, and health care resources used between men and women with asthma.

Design. Population-based cross-sectional telephone interview survey of Canadians with doctor-diagnosed asthma.

Subjects and methods. Random digit dialing was used to identify a representative sample of Canadians with asthma. A total of 801 adults were interviewed over the telephone. Analysis was performed on the data from a subgroup of 20- to 50-year-old patients with asthma who participated in the original survey (329 women and 183 men).

Results. Women and men were equally likely to be poorly controlled (58% vs. 56%, $p > 0.05$) as defined by failing to meet two or more of six symptom-based criteria listed by the 1996 Canadian Asthma Consensus (CAC) Guidelines as appropriate treatment targets. However, there were significant differences in medication used; women were more likely than men to use an inhaled corticosteroid in the treatment of their asthma (59% vs. 45%, $p < 0.05$) and were more knowledgeable about their appropriate use (62% vs. 46%, $p < 0.05$), and were more likely to be satisfied with their physicians' care. Despite this, women were more likely than men to have required urgent care for their asthma in the year preceding the survey (50% vs. 36%, $p < 0.05$).

Conclusion. Women report greater need for urgent asthma care despite more frequent use of inhaled corticosteroids and better asthma knowledge scores than men.

Keywords survey, control, symptoms, patient education

INTRODUCTION

Epidemiologic studies of asthma have shown consistent gender differences in asthma prevalence and morbidity. In childhood, asthma is more common in boys than girls, and boys with asthma are hospitalized more often than girls (1–3). The prevalence of asthma between the genders begins to equalize during adolescence so that by adulthood, the prevalence of asthma is similar or slightly greater in women than in men (3–5). Despite a similar prevalence of asthma, there are significant gender differences in the rates of emergency room visits, hospital separation rates, and time spent in hospital (6–10) with women affected more often in a 2 or 3:1 ratio. These gender differences in morbidity have been documented in many countries and do not seem to be influenced by the availability of a universal health care system (8).

The Asthma in Canada Study (2001) was designed to assess the degree of asthma control achieved by patients with asthma in Canada and to describe the impact of poor asthma control (11). The study demonstrated that the majority of Canadians with asthma have inadequate control of their disease and that sub-optimal control of asthma is associated with excess health

care utilization. To determine whether gender differences in the morbidity of asthma in a community setting could be identified, we undertook a gender analysis of the data from the Asthma in Canada Study.

METHODS

The Asthma in Canada survey was conducted from September to October 1999 using a nationwide random digit dialing process to identify individuals affected by asthma. Trained interviewers screened 49,767 Canadian households to identify 801 adults with asthma and 200 parents of children with asthma (4 to 15 years of age). Patients with asthma were defined operationally as those who were diagnosed with asthma by a physician and had experienced asthma symptoms in the past year. Only individuals who had taken prescription medication for the treatment of asthma in the past year were included in the sample. Interviewers used a structured questionnaire to determine whether respondents had achieved symptomatic asthma control as targeted by the Canadian Consensus Guidelines for the Management of Asthma. The methodology and results of the Asthma in Canada Study have been published previously (11).

For the present study, data from 20- to 50-year-old Canadian asthma patients were separated from the main Asthma in Canada data set, and an analysis by gender was performed. This age group was studied to prevent confounding by patients with chronic obstructive lung disease (COPD).

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These data were then re-weighted to Statistics Canada age and gender population estimates for 20- to 50-year-old Canadian asthmatics.

The proportions were compared between men and women using Fisher's Exact Test. Differences were considered significant at the $p < 0.05$ level.

RESULTS

Asthma Control

Data from 512 individuals were analyzed: 329 women and 183 men. Men and women in the sample had similar educational attainment with the majority completing both high school and technical secondary school. The socio-economic status of the men and women was also similar with the majority making below 100,000 dollars (Canadian) annually.

Fifty-seven percent of patients with asthma failed to meet at least 2 of the 6 control criteria and were categorized as having poorly controlled asthma. Women and men were equally likely to be poorly controlled on two or more parameters (58% vs. 56%, $p > 0.05$). There were no differences between men and women in terms of the total number of poorly controlled parameters they reported (Figure 1). Overall, there was no gender difference in the reported frequency of the parameters of poor asthma control. However, in the cohort of patients with poorly controlled asthma, women were significantly more likely to report limitations on physical activity (63% vs. 50%, $p < 0.05$), absenteeism (39% vs. 27%, $p < 0.05$), and exacerbations (24% vs. 14%, $p < 0.05$) (Figure 2). With respect to perceived asthma control, men and women did not differ in terms of self-ratings and were equally likely to identify themselves as adequately controlled when, in fact, they were not (87% vs. 86%, $p > 0.05$).

Health Care Resource Use

There were significant gender differences in health care resource utilization. Women were more likely to report an overall need for urgent care in the past year (50% vs. 36%, $p < 0.05$) and unscheduled visits to their physicians for asthma (40% vs. 25%, $p < 0.05$) (Table 1). Although the

Patients Experiencing Poor Control by Parameter

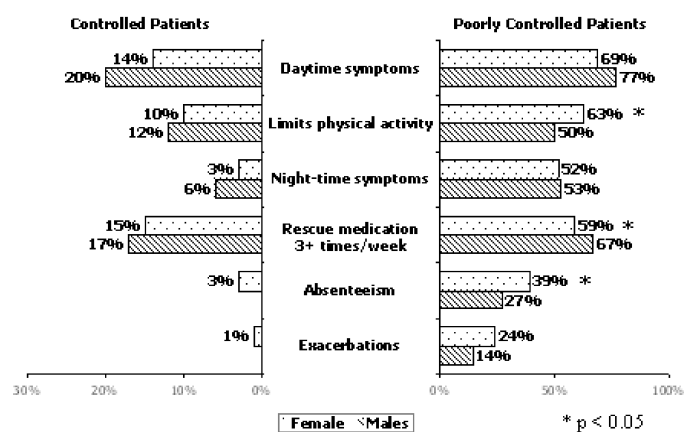


FIGURE 2.—Comparison of controlled and uncontrolled patients. The frequency of suboptimal control by specific symptom parameters of control.

difference was not statistically significant, women reported visiting the emergency room and being admitted to hospital more frequently than men. Overall, women reported significantly more satisfaction than men with respect to their prescribing physician. This included satisfaction with the amount of time spent with the physician (43% vs. 28%, $p < 0.05$), the willingness of the physician to spend the necessary time (45% vs. 31%, $p < 0.05$), and the ability of the physician to explain asthma management adequately (37% vs. 25%, $p < 0.05$). Although not statistically significant, women tended to be more confident with their physician's knowledge of asthma, asthma management, and knowledge of new treatments (Table 2).

Medication Utilization

Men and women differed with respect to the combination of medications they reported using for their asthma. Overall, women were more likely to report using inhaled corticosteroids (ICS) than men (59% vs. 45%, $p < 0.05$), but reported the same use of short-acting beta agonists (SABA) medications (80% vs. 79%, $p < 0.05$) (Figure 3). Men were more likely to report using SABA alone to control their asthma (42% vs. 33%, $p < 0.05$). Among users of controller medication, women were more likely to report both an increased use of ICS (23% vs. 13%, $p < 0.05$) and SABA (26% vs. 12%, $p < 0.05$) medications in the past 3 months, and this trend was evident for both the poorly controlled and controlled patients (Figure 4). No statistically significant difference appeared between men and women on reported compliance with

Number of Symptom Parameters by Which Patients Experienced Poor Control

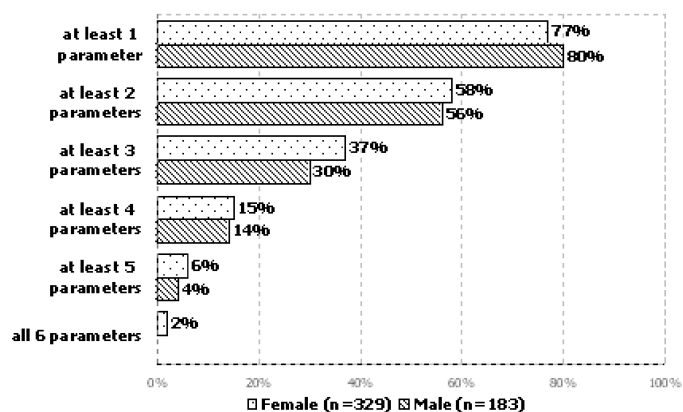


FIGURE 1.—Proportion of men and women failing to achieve disease control by one or more symptom parameters of control.

TABLE 1.—Utilization of health care resources.

	Total (n = 512)	
	Women (n = 329)	Men (n = 183)
Any urgent care in past year (net)*	50%	36%
- Unscheduled doctor's visit*	40%	25%
- Been to emergency room	26%	20%
- Admitted to hospital	6%	3%

* $p < 0.05$ for the difference between women and men.

TABLE 2.—Proportion of patients rating physician care as “excellent.”

	Total (n = 512)	
	Women (n = 329)	Men (n = 183)
Willingness to spend the necessary time with you*	45%	31%
Amount of time spent with you*	43%	28%
Ability to explain asthma management to you*	37%	25%
Knowledge of asthma and asthma management	34%	28%
Knowledge of new treatments for asthma	28%	24%

* $p < 0.05$ for the difference between women and men.

prescribed medication regimens and concerns about cost and affordability of medications.

Knowledge and Attitudes

Significant gender differences were also identified in surveying knowledge and attitude towards asthma. Women were more knowledgeable about the role of ICS than men (62% vs. 46%, $p < 0.05$). Interestingly, women with poorly controlled and adequately controlled asthma were equally knowledgeable of the role of ICS (62% vs. 63%) (Table 3). There was a nonsignificant trend toward women being more knowledgeable about the role and proper usage of rescue medications than men. Men were significantly more likely to believe incorrectly that the role of SABA medication is to reduce airway inflammation (25% vs. 15%, $p < 0.05$). Attitudes towards asthma also showed gender differences. Women were significantly more likely than men to consider asthma as a life-threatening condition. However, women were more optimistic than men in terms of asthma management and were more likely to believe that there are treatments today that can offer asthmatics normal, symptom-free lives (87% vs. 79%, $p < 0.05$) (Table 4).

DISCUSSION

Gender analysis of the population-based Asthma in Canada Survey demonstrates significantly greater utilization of health care resources and medications by women with asthma than men with asthma. While men and women are equally likely

Increased Use of Medication in Past 3 Months —Among Controller Medication Users—

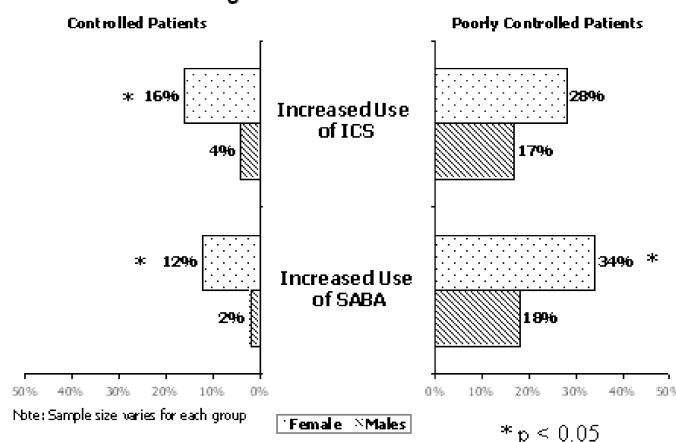


FIGURE 4.—A comparison between men and women of medication increases in the 3 months before the survey.

to have poorly controlled asthma, women with poorly controlled asthma are also more likely to report limitations on physical activity, absenteeism, and exacerbations. Previous research on gender and asthma has demonstrated increased morbidity due to asthma for women in terms of emergency room visits (6, 7), hospital separation rates (7–9), and the amount of time spent in hospital (8). A 10-year longitudinal study of high-risk asthmatics found that high-risk female patients are admitted to hospital twice as often as high-risk male patients, and women tend to have longer admissions (12). In Canada, despite improved access to ambulatory health care for women in a universal health care system, there continues to be a marked gender difference in hospital admission rates and overall time spent in hospital, with women consistently showing higher rates (8). This study suggests that the increased morbidity for women with asthma is also present in the community setting.

Gender differences in asthma morbidity are most likely due to a combination of psychosocial and physiological determinants of health and disease (13). Psychosocial determinants of health include knowledge with respect to a disease and its management, the relationship between a patient and their health care providers, and adequate and appropriate use of therapy. Despite the combination of increased knowledge, better patient-physician relationship and more appropriate medication use, women with asthma had no better control of asthma and greater resource utilization than men with asthma.

Much has been written about the importance of education in asthma management, and the opportunity to increase knowledge for patients with asthma has been the cornerstone of asthma education programs (14, 15). The gender analysis of the Asthma in Canada Study demonstrates that women have poorer outcomes despite better knowledge about asthma and medications. While it is generally understood that increased knowledge is not necessarily reflected in improved behavior (16), it is also possible that knowledge about asthma and medications alone is insufficient for achieving best outcomes. Both men and women in the survey have a similar gap in understanding about asthma control, reflected in 86%

Current Use of Asthma Medications

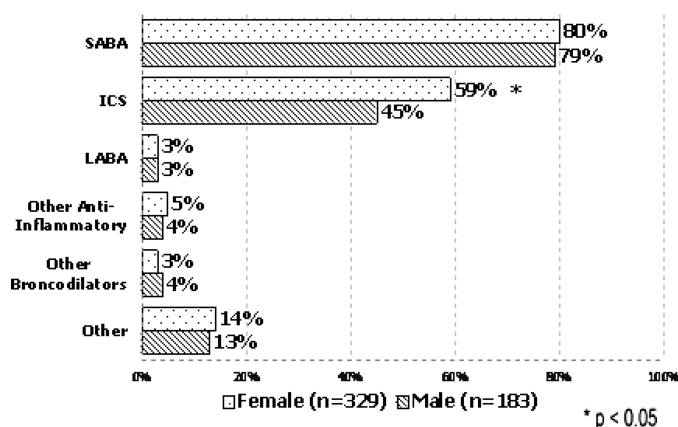


FIGURE 3.—Comparison of medication use between men and women surveyed.

TABLE 3.—Perceived role of inhaled corticosteroids (ICS) among current users.

	Poorly controlled (n = 182)		Controlled (n = 100)	
	Women (n = 127)	Men (n = 55)	Women (n = 73)	Men (n = 28)
Not sure how it works or what it does	21%	27%	16%	33%
Helps control symptoms by opening up the bronchial tubes	16%*	31%*	22%	12%
Helps control asthma by reducing inflammation in airways	62%*	42%*	63%	54%

* $p < 0.05$ for the difference between women and men.

and 87%, respectively, believing they are adequately or well controlled when, in fact, they are not. This gender analysis of the Asthma in Canada Study then suggests that knowledge about control may be the critical element for improved asthma outcomes.

Although women with asthma report a higher degree of satisfaction with the availability and knowledge of their physicians than men with asthma, this is not reflected in a greater degree of control. It is possible that high accessibility does not necessarily reflect best care as has been demonstrated for women with other conditions such as sleep apnea (17), hypertension, and cardiovascular disease (18). The Council on Ethical and Judicial Affairs (18) has suggested that such poorer outcomes may be due to biases in terms of the approach physicians take to women because of preconceived notions of prevalence of disease or the significance of reported symptoms. It is also possible that, despite greater morbidity, women are truly satisfied with their relationship to and care given by their physician because neither the physician nor the patient understands the gap in their achieving asthma control.

In terms of therapy, women report using a more appropriate combination of controller and SABA medications, whereas men are more likely to report using only SABA. While it is possible that women in the Asthma in Canada Study overestimated their compliance with medication regimens, it may be that women have relatively poorer outcomes because there are actually gender differences in response to therapy.

Women's greater morbidity from asthma could also be explained if women have more severe asthma due to physiologic gender differences. Although boys develop asthma at a younger age and have higher prevalence rates throughout childhood (1–3, 13), during adolescence this male-to-female ratio reverses, with women developing equal or slightly greater prevalence rates throughout adulthood (3–5). One of the hypotheses generated to explain the improvement when boys go through puberty is that, unlike adolescent girls, there is a disproportional increase in airway size relative to lung volume that decreases the severity of asthmatic symptoms due to bronchoconstriction (19). The greater number

of emergency room visits and hospitalizations experienced by women throughout adulthood has also been attributed to hormonal influences. Variation in asthmatic symptoms with respect to the menstrual cycle has been previously demonstrated, with up to 46% of women who visit the emergency room as a result of asthma being in the perimenstrual period (20). Studies of asthmatic women suggest an abnormal ovarian sex hormone regulation of β_2 -receptors with a failure of upregulation of receptor density that occurs in normal women with increases in progesterone and possibly estrogen (21). Thus, some of the greater morbidity experienced by women asthmatics may be accounted for by alterations in sex hormone regulation of the beta-adrenergic system.

Gender differences in asthma morbidity could also be due to gender differences in response to anti-inflammatory medications, particularly corticosteroids. This study suggests that women may have a decreased response to inhaled corticosteroids since they have greater morbidity despite more use of ICS on a regular basis. A double-blind randomized controlled trial of inhaled fluticasone propionate has demonstrated similar sex differences, with men obtaining a significantly greater improvement in airway responsiveness with inhaled corticosteroid treatment (22). The differential effect of inhaled corticosteroids is also suggested by the data that Canadian women with asthma have not achieved the same decrease in hospitalization rates as men since the introduction and utilization of high-dose inhaled steroids in the late 1980s (8). While differences in the effectiveness of inhaled steroids may be related to the inhalational route of delivery and gender variations in airway sizes, the increased duration of hospitalization for women with asthma also suggests decreased responsiveness to systemic steroids. These observations support the emerging hypothesis that there are significant and, as yet unrecognized, gender differences in physiology, which are a primary cause of the greater morbidity for women with asthma.

Some limitations to our study must be noted. First, our telephone survey relied on patient recall of symptoms to assess disease control. It is possible that women and men differ, in part, in their perception of symptoms and we have

TABLE 4.—Attitudes toward asthma between women and men (% agreement).

	Total (n = 512)	
	Female (n = 329)	Male (n = 183)
Asthma is a serious health problem in Canada	95%	96%
With proper treatment most people with asthma can lead a full and active life	94%	92%
Asthma is a potentially life threatening condition*	94%	86%
People with asthma today have better control of their disease compared to ten years ago	91%	87%
Treatments available today can control people's asthma so they can lead normal, symptom-free lives*	87%	79%
Even with proper treatment asthma usually causes some lifestyle limitations	80%	77%

* $p < 0.05$ for the difference between women and men.

no measurements of lung function that would assess disease severity in more objective terms. Second, we relied on physician diagnosis of asthma as reported to us by patients. We cannot rule out the possibility that some of the respondents did not suffer from asthma. Indeed, we have recently shown gender bias in the diagnosis of obstructive lung disease (23). Given the somewhat earlier onset of chronic obstructive lung disease in woman as compared to men (24), this raises the possibility that some of the women surveyed actually suffered from nonasthmatic obstructive lung disease. By limiting the upper age of those surveyed, we hoped to minimize the risk of such confounding. Finally, we relied on the voluntary participation of patients and cannot rule out the possibility that only the most severely affected chose to respond. However, in an independent practice-based survey of asthma control conducted in primary practice, we have found sub-optimal degrees in asthma control in the absence of comparable recruitment bias (25).

Looking at various diseases through a "gender lens" or from a gender perspective is beginning to be recognized as a useful tool in understanding disease etiology and management. Research on gender issues in asthma remains in its infancy. The gender analysis of the Asthma in Canada Study reinforces that a significant number of both men and women fail to achieve asthma control. Both men and women have a significant gap in their understanding of asthma control. Men are often managed without anti-inflammatory medications and are not as knowledgeable as women about asthma and their medications. Despite these advantages, women asthmatics have greater utilization of health care resources in the community setting. Coupled with the already demonstrated increased rate of emergency room visits and hospitalizations for women, these findings reinforce the need for research into physiologic and psychosocial gender differences in asthma. This study also clearly demonstrates the urgent need for education of all asthmatics about the definition and expectations for asthma control. By understanding and exploring health problems from a gender perspective, we can better reduce the burden of asthma for both men and women.

ACKNOWLEDGMENTS

Supported by a grant through GlaxoSmithKline, Canada, and a Summer Studentship from the Department of Medicine, Sunnybrook, and Women's College Health Sciences Centre.

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