

Gender Gap in Psychogenic Factors May Affect Perception of Asthma Symptoms

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■ Abstract

Background and Objective: Clinical practice suggests that asthma coping strategies might be different in women and men. The aim of this study was to compare the relationship between psychological variables and the perception of asthma symptoms in women and men.

Patients and Methods: A total of 165 adult asthma patients with mild to severe persistent asthma were studied. We performed spirometric tests, measured dyspnea on the Borg scale, assessed psychological health using the Goldberg 28-item General Health Questionnaire (GHQ-28), and measured the tendency towards social desirability using the lie scale from the Eysenck Personality Questionnaire.

Results: Women had significantly worse results than men on the GHQ somatic symptoms and anxiety/insomnia subscales and on the overall scale that measures the general index of perceived health. Sex was a statistically significant moderator on the correlation between dyspnea and both the tendency to lie and the GHQ-28 functional disorders/social dysfunction subscale. The correlation between dyspnea and the tendency to lie was positive in women and negative in men.

Conclusions: Perceived dyspnea is correlated with psychological health and the tendency to lie and the correlation between perceived dyspnea and certain psychological variables is different in women and men.

Key words: Asthma. Psychosocial factors. Health-related quality of life questionnaires. Dyspnea. Gender.

■ Resumen

Antecedentes y objetivo: La práctica clínica indica que las estrategias para combatir el asma en hombres y mujeres pueden ser diferentes. El objetivo de este estudio fue comparar la relación entre las variables psicológicas y la percepción de los síntomas del asma en hombres y mujeres.

Pacientes y métodos: Se estudió a 165 pacientes adultos con asma persistente de leve a grave. Se realizaron espirometrías, se midió la disnea según la escala de Borg, se evaluó el estado de salud psicológico con el cuestionario de salud general de Goldberg de 28 ítems (GHQ-28) y se determinó la tendencia a la deseabilidad social mediante la escala de mentiras (L) del cuestionario de personalidad de Eysenck.

Resultados: Las mujeres obtuvieron resultados significativamente peores que los hombres en las subescalas de síntomas somáticos y de ansiedad/insomnio del GHQ y en la escala global que determina el índice general de salud percibida. El sexo fue un moderador estadísticamente significativo de la correlación entre la disnea y la tendencia a mentir y la subescala de trastornos funcionales/difunción social del GHQ-28. La correlación entre la disnea y la tendencia a mentir fue positiva en las mujeres y negativa en los hombres.

Conclusiones: La disnea percibida está correlacionada con la salud psicológica y la tendencia a mentir, y la correlación entre la disnea percibida y determinadas variables psicológicas es diferente en hombres y en mujeres.

Palabras clave: Asma. Factores psicosociales. Cuestionarios sobre calidad de vida relacionada con la salud. Disnea. Sexo

Introduction

Asthma is more common in boys than girls during early childhood. The prevalence equalizes between sexes during adolescence and then switches to female predominance in adulthood [1-2]. A certain, sex-dependent, genetic predisposition, which has a significant effect on risk and asthma phenotype in women, has been described [3].

While wheezing and dyspnea are present in all patients with exacerbated asthma, they have a relatively weak relationship with the degree of airflow limitation [4]. Rubinfield and Pain [5] have demonstrated that some patients do not experience severe dyspnea, even during significant bronchial obstruction, whereas others complain of dyspnea even when spirometric results are close to normal values. It has also been shown that some asthmatics have a very poor perception of airway obstruction [6].

Emotional factors have been linked with sudden episodes of brittle asthma and may also play a role in other asthma phenotypes [7]. Numerous studies have demonstrated an association between psychiatric disorders and asthma [8-11], with this association oscillating between 30% and 63% [12]. The predominant conditions in such cases are anxious depressive disorders and personality disorders [13-15]. Studies conducted in patients with life-threatening severe asthma have shown the presence of significant psychiatric disorders in almost half of the cases [16]. On the other hand, the ability to cope with stress depends on other personality variables such as neuroticism [2] or related indicators, a feeling of being in control of situations and of personal efficacy [17,18], anxiety [19,20], self-esteem [18,20], and optimism [17,21].

Martinez-Moragon et al [22] have shown that perception of dyspnea correlates with airway obstruction, emotional status, and female gender but does not necessarily correlate well with airway obstruction.

The aim of this study was to investigate the moderating effect of psychological states on the perception of asthma symptoms in women and men. We tested the following hypotheses: *a*) women differ from men in their perception of dyspnea and this is affected, at least partly, by psychogenic factors; and *b*) perceived health and the tendency to lie are related to dyspnea intensity and spirometric variables.

Methods

The study was conducted with 165 consecutive asthma patients seen, either for a scheduled follow-up visit or due to exacerbation of asthma symptoms, at the outpatient clinics of the Department of Medicine at the University Hospital in Krakow, Poland. Women comprised 67% of the sample. The mean (SD) age of the group was 49.0 (14.1) years. The mean ages of the women and men were 49.8 (13.9) and 47.3 (14.5) years, respectively. No significant differences were observed in age distribution ($P>.05$). Asthma severity was classified according to the guidelines of the Global Initiative for Asthma (GINA) [23] as intermittent (3.77%), mild persistent (44.0%), moderate persistent (32.2%), and severe persistent (20.1%).

There were no significant differences in severity between women and men ($P=.215$). Patients with intermittent asthma were included in the group of mild persistent asthma because of the small number of participants in this subgroup.

The study protocol was approved by the university's ethics committee and written informed consent was obtained from all participants.

A structured interview was used to collect demographic data and information on treatment. Dyspnea intensity was measured on the 10-point Borg scale [24]. Immediately thereafter, a spirometric test was carried out using a Jaeger MasterLab (Germany) spirometer. Assessment of psychological health was conducted by means of the David Goldberg 28-item General Health Questionnaire (GHQ-28) and the results were analyzed on the following subscales: A, somatic symptoms; B, anxiety, insomnia; C, functional disorders/social dysfunction; and D, depressive symptoms [25,26]. The lie scale from the Polish version of the Eysenck Personality Questionnaire (EPQ) was used to measure the tendency toward social desirability [27]. This scale is regarded as a measure of defensiveness defined as an unwillingness to admit or to reveal to others one's personal thoughts or experiences.

Statistical Analysis

The *t* test was used to investigate differences in study variables between women and men and Pearson correlation coefficients were used to analyze correlations between dyspnea intensity and certain spirometric variables, and the results of the various subscales of the GHQ-28 and the values obtained on the EPQ lie scale (EPQ-L). A general linear model (GLM) was applied to test the moderating effect of sex on the relationship between dyspnea and spirometric parameters. This method is used to check whether a relationship between 2 continuous variables differs among subgroups. Statistical significance was set at a *P* value of $<.05$.

Results

There were no differences between women and men in terms of standard spirometric values ($P>.05$, Table 1). There was a negative correlation between the selected spirometric values and dyspnea intensity ($P=.01$). The Pearson *r* correlation coefficients for these correlations were -0.30 for forced expiratory volume in the first second (FEV_1), -0.34 for forced vital capacity, -0.15 for mid-expiratory flow at 75% (MEF_{75}), -0.22 for MEF_{50} , and -0.25 for MEF_{25} . No significant differences were noted for mean (SD) dyspnea intensity between women (2.19 [1.85]) and men (1.96 [1.41]).

Women scored higher than men on all the variables tested on the GHQ-28 subscales, and their overall score was also higher. Higher scores on the GHQ-28 reflect worse health states. The scores for women were significantly higher than those for men for somatic symptoms, anxiety/insomnia, and general perception of health (Table 2). No significant differences were detected between women and men for dyspnea intensity or the tendency to lie ($P>.05$).

Motivated by Goldberg [26], we also tested the relationship

Table 1. Differences in Spirometric Variables by Sex

	Mean		SD	
	Women	Men	Women	Men
FEV ₁	79.46	78.37	22.01	24.48
FVC	91.03	91.21	17.75	19.05
MEF ₂₅	63.91	61.13	30.60	25.53
MEF ₅₀	54.41	53.66	31.87	27.59
MEF ₇₅	51.76	47.98	34.99	27.93

Abbreviations: FEV₁, forced expiratory volume in the first second; FVC, forced vital capacity; MEF_{25, 50, 75}, mid-expiratory flow at 25%, 50%, 75% of VC.

between GHQ-28 scores and the EPQ-L but no statistically significant differences were observed in any of the areas. The moderating effect of sex on the relationship between GHQ-28 subscale scores and EPQ-L scores was also tested using the GLM with interactions, but no significant differences were found.

As shown in Table 3, dyspnea was significantly correlated with all the GHQ-28 scores but not with EPQ-L scores. MEF₂₅, in contrast, correlated negatively with EPQ-L scores and FEV₁ correlated negatively with depressive symptoms. In other words, higher FEV₁ values were correlated with better perceived health.

In the next analysis we checked whether the relationship between dyspnea intensity, spirometric parameters, and psychological variables was moderated by the sex of the patient. The results showed that sex was a significant moderator in just 3 relationships: dyspnea and the tendency to lie (EPQ-L), dyspnea and functional disorders/social dysfunction, and MEF₂₅ and depressive symptoms (Table 4).

As can be seen, the correlation between dyspnea and EPQ-L scores was quite different between women

and men: while in the former the relationship was positive (that is, the more severe the dyspnea, the stronger the tendency to lie), in the latter it was negative (the less severe the dyspnea, the stronger the tendency to lie) (Figure 1).

Table 2. Differences in Psychological Variables by Sex^a

	Mean		SD		P
	Women	Men	Women	Men	
GHQ-28-A ^b	18.10	15.70	4.33	3.86	.001
GHQ-28-B ^b	15.47	14.04	4.18	4.33	.051
GHQ-28-C ^b	16.10	15.52	3.60	2.76	.320
GHQ-28-D ^b	9.96	9.08	3.65	2.83	.134
Total score	59.63	54.34	12.19	10.57	.009

^aAnalyzed using the *t* test.

^bGeneral Health Questionnaire (GHQ)-28 subscales: A, somatic symptoms; B, anxiety, insomnia; C, functional disorders/social dysfunction; D, depressive symptoms.

Table 3. Pearson Correlations Between Spirometric Variables and Dyspnea Intensity and Perceived Health and Tendency to Lie

	FEV ₁	FVC	MEF ₂₅	MEF ₅₀	MEF ₇₅	Dyspnea
EPQ-L	-0.13	-0.07	-0.18 ^a	-0.15	-0.08	0.08
GHQ-A ^c	0.09	-0.02	0.15	0.11	0.06	0.35 ^b
GHQ-B ^c	-0.03	-0.03	-0.01	-0.01	-0.01	0.33 ^b
GHQ-C ^c	-0.05	-0.12	0.01	-0.05	-0.09	0.33 ^b
GHQ-D ^c	-0.16 ^a	-0.16	-0.12	-0.09	-0.08	0.29 ^b
GHQ	-0.04	-0.10	0.02	0.00	-0.03	0.42 ^b

Abbreviations: EPQ-L, Eysenck Personality Questionnaire lie scale; FEV₁, forced expiratory volume in the first second; FVC, forced vital capacity; MEF_{25, 50, 75}, mid-expiratory flow at 25%, 50%, 75% of VC.

^a*P* < .05.

^b*P* < .01.

^cGeneral Health Questionnaire (GHQ)-28 subscales: A, somatic symptoms; B, anxiety, insomnia; C, functional disorders/social dysfunction; D, depressive symptoms.

Table 4. Moderator Analyses. Sex as a Moderator of the Relationships Between Dyspnea Intensity, Spirometric Parameters, and Psychological Variables

	FEV ₁ <i>P</i>	FVC <i>P</i>	MEF ₂₅ <i>P</i>	MEF ₅₀ <i>P</i>	MEF ₇₅ <i>P</i>	Dyspnea <i>P</i>
EPQ-L	.023 ^a	.885	.319	.194	.271	.271
GHQ-A ^b	.889	.372	.276	.347	.305	.351
GHQ-B ^b	.780	.600	.689	.981	.800	.518
GHQ-C ^b	.051 ^a	.856	.873	.617	.422	.698
GHQ-D ^b	.929	.279	.103	.049 ^a	.087	.270
GHQ	.473	.864	.911	.695	.782	.894

Abbreviations: EPQ-L, Eysenck Personality Questionnaire lie scale; FEV₁, forced expiratory volume in the first second; FVC, forced vital capacity; MEF_{25, 50, 75}, mid-expiratory flow at 25%, 50%, 75% of VC.

^aStatistically significant.

^bGeneral Health Questionnaire (GHQ)-28 subscales: A, somatic symptoms; B, anxiety, insomnia; C, functional disorders/social dysfunction; D, depressive symptoms.

No relationship was observed between dyspnea and functional disorders/social dysfunction for men. In women, however, more severe dyspnea was correlated with more pronounced functional disorders (*P* = .05).

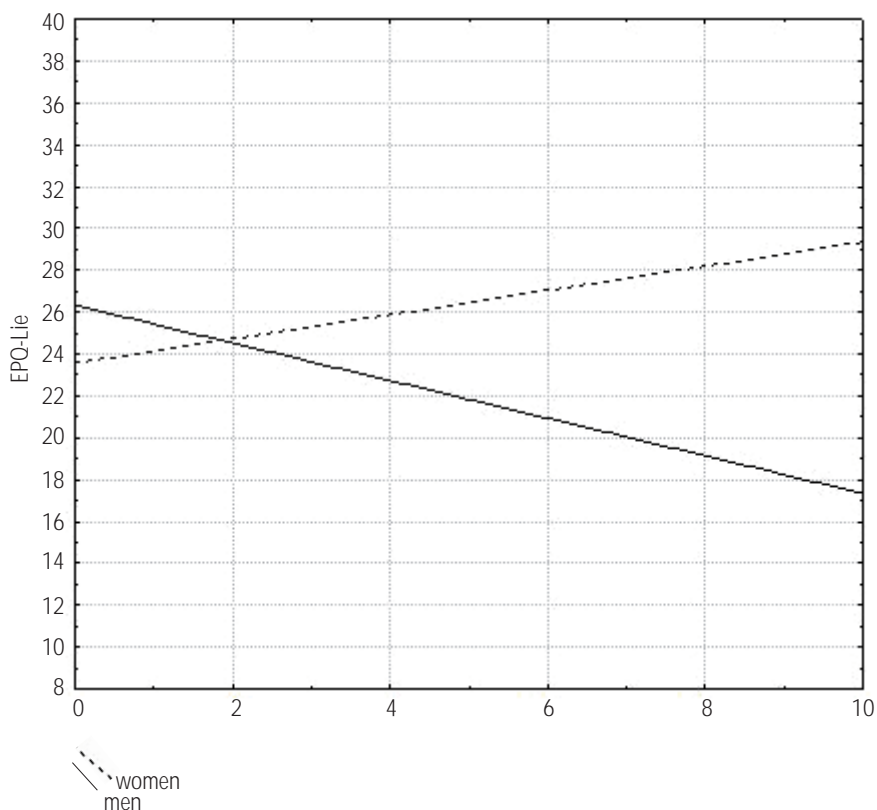


Figure. Relationships between dyspnea and tendency to lie in groups of women and men. EPO-Lie indicates the Eysenk Personality Questionnaire lie scale.

Discussion

The first hypothesis stating that women differ from men in their tendency to lie and their perception of health and dyspnea was only partially confirmed. More specifically, no differences between women and men were detected in terms of perceived dyspnea and spirometric variables. A difference was noted, however, for psychological indices, which reflect subjective perceptions of illness. Specifically, women had higher (ie, worse) results for somatic symptoms (GHQ-28-A), anxiety and insomnia (GHQ-28-B), and the general health index (GHQ-28). It cannot be ruled out that higher scores for reported symptoms reflect cultural patterns, according to which it would be more acceptable for women to appear fragile and express somatic and emotional complaints.

There were no differences between women and men for objective spirometric variables. There may be 2 explanations for the differences detected in the perception of illness: 1) men do indeed experience fewer psychological consequences of their illness than women; and 2) men underestimate (repress) their illness. The present data cannot be used to draw any conclusions in this respect but we believe that both hypotheses deserve further investigation.

Our findings are supported by psychiatric population studies which show that women are at increased risk of

experiencing anxiety or depressive disorders during their lifetime [28]. Sue et al [29] have shown that patients who are dependent, anxious, and focused on their own state of health usually manifest severe dyspnea during an interview, while spirometry reveals only mild airway obstruction.

In our study there was a moderate relationship between selected spirometric values and dyspnea intensity. Brand [30] demonstrated a relationship between a greater perception of dyspnea and female sex while Stravinskaite et al [31] showed that dyspnea perception depended on bronchial responsiveness, but not on sex [31].

Wijnhoven et al [32] found that woman with asthma report poorer health-related quality of life than men [32]. This seems to be due more to a heightened perception of disease severity than to an actual greater severity of disease in terms of pulmonary obstruction. Men tend to report higher health-related quality of life than women of the same age, despite higher mortality and lower life expectancy. Moreover, men have reported receiving more social support than women [33].

As for the second hypothesis, that men tend to underestimate the severity of their disease, it is noteworthy that the correlations between spirometric variables and GHQ-28 scores were nonexistent. However, all the indices of perceived health were positively related to dyspnea. It would thus seem that perceived dyspnea is the main determinant of the subjective

wellbeing of patients. Recording spirometric variables alone may not be sufficient to evaluate perceived health among patients.

The moderator analyses also yielded some interesting results. Dyspnea was negatively correlated with the tendency to seek social approval (as measured by the EPQ-L) in men, but positively correlated in women. In other words, men, unlike women, tended less to seek social approval when they experienced more severe dyspnea. Psychologically, this could be explained by a certain repression. For men, being ill may be more costly in terms of social and professional relationships, and they therefore may tend to ignore their illness, especially in terms of seeking social approval. For women, in contrast, illness may bring them to look for social support, reflected by a greater tendency to seek social approval. Such an interpretation is obviously just a speculation, but it might explain the results obtained.

Numerous studies have investigated the effect of sex on GHQ subscale and overall scores. In studies which have found sex-related differences, women scored higher than men [33-35]. There are data, however, which call the biological origin of these differences into question. Subjecting sociodemographic variables to controls in studies often abolishes differences in the results obtained in women compared to men [9,24].

Sex was also a moderator of the relationship between dyspnea and functional disorders. No such effect was detected for men, but functional disorders/social dysfunction were more pronounced in women with severe dyspnea. Thus again, it is possible that women are more vulnerable to the most obvious symptom of asthma, dyspnea.

People differ in the habitual way in which they behave in stressful situations [20]. A suppressive behavior model, consisting of a reluctance to acknowledge asthma symptoms, has been observed in women, who, accordingly would turn their attention away from the stressor and away from their reactions to this stressor [36]. It has also been noted that even in times of exacerbation, patients with pulmonary diseases are particularly inclined to stifle emotions and anxiety related to their illness [37]. However, denial of symptoms increases the risk of not following either the recommended treatment plan or lifestyle changes. On the other hand, excessive concentration on somatic symptoms (hypochondriac tendencies) can also adversely affect treatment results.

Most patients with asthma have mild to moderate disease, which is well controlled by a combination of anti-inflammatory drugs and β_2 -adrenoceptor agonists. However, in about 10% of patients, asthma remains symptomatic despite treatment with high doses of inhaled corticosteroids. These patients, who require treatment with continuous or near-continuous oral corticosteroids, experience the greatest impairment in terms of lifestyle, and account for a disproportionate use of health care resources. Refractory asthma is a heterogeneous disorder that can be subdivided on the basis of different etiological, physiological, or pathophysiological characteristics [38-40]. Our results indicate that psychological factors are related to severe asthma and can possibly affect its course. These factors may also influence the results of clinical trials and should be probably taken into account in inclusion criteria and analysis of data.

Conclusions

1. Perceived dyspnea is related to psychological health and the tendency to lie.

2. The relationship between perceived dyspnea and certain psychological variables is different in women and men.

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