

COMORBIDITY

Factors Associated with a Higher Prevalence of Work Disability among Asthmatic Patients

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Objective. To study asthma-related absenteeism in the asthmatic population in Spain and to identify some risk factors for absenteeism. **Methods.** A cross-sectional study was performed on patients who had been diagnosed with asthma in the primary care setting at least 1 year before the start of this study. A questionnaire was designed that included socio-demographic and clinical variables. The time absent from work in the previous year was self-reported by the patients. **Results.** More than 25% of the asthmatic population in Spain took sick leave during the previous year. Visits to a general practitioner or to the emergency department are the factors associated with the greatest risk of absenteeism. **Conclusions.** Absenteeism is common within the asthmatic population in Spain. The authors of this study believe that some of the determining factors could be modified by the health-care system.

Keywords absenteeism, asthma, indirect costs, risk factors, work disability

INTRODUCTION

The prevalence and severity of chronic respiratory diseases, along with the consequent economic impact, are a challenge for the public health system (1). In addition, respiratory tract diseases are one of the commonest causes of temporary work disability in Spain (2). Asthma, in particular, is a chronic respiratory disease with high economic costs that globally exceed the combined costs of tuberculosis and HIV/AIDS (3). The cost increases observed during the last few years have been due mainly to higher indirect costs of which absenteeism accounts for a significant proportion (3, 4).

The relationship between asthma and working conditions, particularly among patients with occupational asthma and work-aggravated asthma, has been clearly established (5). It is thought that up to 15% of adult asthma cases can be attributed to occupational exposure (6).

The analysis of the causes of work disability among asthmatics is complex because of the probable multifactor etiology, which includes factors such as the subject's health status, work conditions, and the country's social and sanitary conditions (4).

The debate about the factors most probably associated with a higher risk of absenteeism continues, with different authors reaching different conclusions (5, 7). Greater

knowledge of the factors that tend to increase absenteeism among asthmatics would enable the costs associated with the disease to be reduced (3, 4).

In this work, we intend to identify some of the factors associated with a higher prevalence of absenteeism among employed asthmatic adults from noninstitutionalized populations, estimated from subjects attending primary care centers in Spain from August 2007 to March 2008.

METHODS

Design

We carried out a cross-sectional study of the population of asthmatic patients over 18 years of age attending primary care centers in Spain.

Patients and Data Collection Procedures

Multistage cluster sampling was used. General practitioners were used as sampling units in the first stage (182 sites), and their patients were sampled at random. The following inclusion criteria were used: (1) male and female subjects with ages ranging from 18 to 65 years old; (2) subjects who had been diagnosed with asthma by a physician at least 1 year before; and (3) subjects who had visited the primary care center in the past 2 years. The following exclusion criteria were used: (1) subjects who were unable to read or understand the questionnaires (in the investigator's opinion); (2) subjects who had been diagnosed with chronic obstructive pulmonary disease; (3) subjects who were

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retired; and (4) subjects who were institutionalized. The physicians contacted the selected patients by phone. The patients who refused to participate were considered to be nonresponders.

Data collection was carried out through a personal interview using a questionnaire in the clinic from August 2007 to March 2008. Before starting data collection, the patient signed an informed consent form. This study was authorized by the Hospital Clínico San Carlos (Madrid) Ethics Committee in June 2007.

Variables

The socio-demographic variables of the patient, exposure, burden of the disease, and treatment compliance were measured using a questionnaire specifically designed for this study.

Dependent Variables. Occupational disability was assessed by asking the patient whether he/she had taken sick leave due to asthma in the previous 12 months. Patients had the choice of answering either yes or no.

Independent Variables. Several socio-demographic variables were considered, such as gender, place of residence (town/city), and educational level (primary school/high school/university).

The severity of asthma was classified according to the 2006 edition of the guide Global Initiative for Asthma (8).

Subjects were divided into four mutually exclusive groups in accordance with their scheduled drug therapy: (1) those taking oral corticosteroids (OCS) in the past year; (2) patients treated with a combination of long-acting beta-2 agonist (LABA) and inhaled corticosteroids (ICS) taken together with any other drug except OCS; (3) subjects who were taking ICS as a maintenance treatment without the continuous use of LABA, which could only be taken intermittently on demand; and (4) individuals who were taking only a beta-2 agonist.

Subjects were classified according to their smoking habits as nonsmokers, former smokers, or active smokers. The presence of any distressing events in their lives in the past 15 days (yes/no) was used as an indicator of social stress. The patients were classified as normal weight, overweight, or obese according to their body mass index (BMI: $<25 \text{ kg/m}^2$; $\geq 25 \text{ kg/m}^2$ – 30 kg/m^2 ; $\geq 30 \text{ kg/m}^2$, respectively).

Treatment compliance was measured by three variables: (1) the degree to which the patient adhered to the physician's prescription; (2) the frequency of missed doses as reported by the patient; and (3) the patient's attitude toward compliance with the treatment. This last variable was measured by asking the patients to what extent they agreed with the following sentence (from 0 = completely disagree to 10 = completely agree): "Close compliance with the treatment prescribed by my doctor would much improve my asthma symptoms." This variable was coded into two categories: <8 and ≥ 8 .

Asthma control was measured with the Asthma Control Questionnaire (ACQ) (9). In our study we used the

abridged version of ACQ, omitting the question on pulmonary function whose validity has been demonstrated previously (10). In addition, both the patient and the physician were asked to rate the degree of asthma control.

Patient quality of life was measured with the EuroQol (11).

Statistical Analysis

Statistical analysis was carried out using SAS V8.2 (Statistical Analysis Software Institute Incorporated, Cary, North Carolina, USA) software package. Descriptive statistics were calculated for continuous variables, whereas absolute and relative frequencies were calculated for categorical variables. Logistic regression was used to estimate odds ratios (OR) with 95% confidence interval. For the logistic regression model, all variables with a significance value of $p < .2$ in the univariate analysis were used as predictive variables in the multivariate analysis.

RESULTS

A total of 1673 patients were included in this study (43% male) after excluding those patients who were over 65 years, the age of compulsory retirement (Table 1). It was observed that 40% of our population were smokers or former smokers, 16% were obese, and 62% recognized some lack of adherence to treatment (Table 1). Of those who claimed to have taken sick leave sometime within the previous year, 27% were males and 24% were females (Table 2). The mean time off work due to asthma in the previous year was 11.3 days (standard deviation = 28.7).

Table 2 shows the factors that demonstrated some independent effect on absenteeism. Visits to a general practitioner or to the emergency department in the previous 12 months (related or not to asthma) are the strongest independent predictors of absenteeism, followed by hospital admissions (compared with those asthmatic patients who did not require hospitalization). The probability of being absent from work was 6 times higher in the case of patients who had visited their primary care physician in the last year compared with those who never had to visit their doctor. The risk of absenteeism was more than twice as high in patients whose asthma was poorly controlled compared with those with good disease control.

The risk of hospitalization was also increased by the presence of a recent stressful event.

The probability of absenteeism is higher in former smokers than in patients who never smoked, although the condition of being an active smoker does not seem to have an impact on occupational disability, as indicated by asthma-related absenteeism in this study.

Regarding the severity of asthma, the risk of absenteeism in patients with moderate to severe asthma is 38% higher than in those patients with intermittent or mild asthma. Finally, treatment with OCS is correlated with a reduction in the incidence of absenteeism.

According to our data, other factors included in this study such as allergic sensitization (data not shown),

TABLE 1.—Main characteristics of study patients.

	Number of study patients (%)
Sex	
Male	719 (43%)
Female	954 (57%)
Age	
18–39 years	796 (48%)
40–65 years	877 (52%)
BMI (kg/m ²)	
<25	749 (45%)
25–30	653 (39%)
≥30	269 (16%)
Smoking habit	
No smoker	1011 (60%)
Former smoker	332 (20%)
Active smoker	328 (20%)
Frequency of lack of compliance with medication	
Never	634 (38%)
Occasionally	1039 (62%)
Alcohol consumption	
≤22.5 g	696 (46%)
>22.5 g	804 (54%)
Educational level	
Primary or no studies	690 (41%)
High school or university	979 (59%)
Living environment	
Village	663 (40%)
City	1010 (60%)
Stressful event in the last 15 days	
No	1412 (85%)
Yes	254 (15%)
Therapy compliance (physician's perception)	
Normal, high, or total	1381 (83%)
Poor or very poor	292 (17%)
Importance of compliance (patient's perception)	
<8	411 (25%)
≥8	1261 (75%)
Baseline severity of asthma	
Mild or intermittent	1100 (66%)
Moderate or severe	572 (34%)
Type of therapy	
OCS	94 (6%)
LABA + ICS	1149 (69%)
Only ICS	182 (11%)
Only SABA and/or LABA	227 (14%)
Hospital admission	
No	1577 (94%)
Yes	96 (6%)
Visits to the emergency service	
No	1068 (64%)
Yes	605 (36%)
Visits to primary care physician	
No	95 (6%)
Yes	1577 (94%)
ACQ	
No	1033 (62%)
Yes	640 (38%)

Notes. BMI, body mass index; LABA, long-acting beta-2 agonist; SABA, short-acting beta-2 agonist; ICS, inhaled corticosteroids; OCS, oral corticosteroids; ACQ, asthma control questionnaire.

sex, age, BMI, alcohol consumption, educational level, rural or urban environment, therapeutic compliance, or the patient's attitude toward treatment compliance do not seem to influence the probability of an individual taking sick leave (Table 2).

DISCUSSION

Our results from Spain show the importance of making careful evaluations of work disability among asthmatic patients who seek primary care assistance, given that more than 25% of those patients take sick leave at some time during the year. The health-care system could modify most of the factors that influence these results by achieving better control of the disease, decreasing the smoking prevalence, and providing adequate therapeutic adjustments.

Visits to a doctor, either at a primary care center or at a hospital are factors associated with a higher risk of absenteeism. These visits are probably a result of disease exacerbations, which are known to be related to a higher probability of relapses and lung function deterioration (12, 13).

Disease control is another key factor in asthma management (14). Our results are consistent with those published in the literature, which demonstrate a relationship between poorer disease control and higher work productivity loss, both in the general asthmatic populations (15) and in the subgroups with severe asthma (16, 17).

We highlight the fact that therapy with OCS is correlated with increased work productivity loss in the univariate analysis, although when using the multivariate analysis it appears as a protection factor. These results suggest that OCS are not responsible for causing work productivity loss in asthmatics, but that other factors associated with their use, such as severe forms of the disease or exacerbations are (8). Regarding other aspects of the disease, better results have been observed with OCS therapy. Better outcomes have been reported in hospitals with a wider use of systemic corticosteroids, which is associated with better overall disease management (18); OCS improve lung function and symptoms in poorly controlled asthma (19); and also systemic corticosteroids prevent relapses of acute asthma exacerbations, apparently without the associated increased side effects (20).

The probability of absenteeism is also increased when subjects have recently experienced a stressful event. Other authors suggest a direct relationship between a patient's mental health and the probability of complete or partial work disability; the greater the mental health problems, the greater the probability of some sort of work disability (21, 22). Reference is also made to the correlation between negative life events and a worse quality of life, regardless of the baseline severity of the asthma and lung function.

This study indicates that being a former smoker increases the probability of absenteeism by 39%, when compared with nonsmokers, whereas being an active smoker apparently has no effect on the probabilities. This could be explained by the "healthy smoker" effect, whereby patients with fewer smoking-related respiratory symptoms would still continue smoking (23). The lack of influence of active smoking on the development of work disabilities (24–29) and the increased probability of

TABLE 2.—Selected variables of absenteeism. Bivariate and multivariate analysis (1673 patients with ages ranging from 18 to 65 years).

	% patients who take time off work	OR (95% CI)	
		Crude	Adjusted ^a
Sex			
Female	24.53 (234/954)	1	
Male	27.12 (195/719)	1.14 (0.92–1.43)	
Age			
18–39 years	24.75 (197/796)	1	
40–65 years	26.45 (232/877)	1.09 (0.88–1.36)	
BMI (Kg/m ²)			
<25	25.37 (190/749)	1	
≥25–30	27.41 (179/653)	1.11 (0.88–1.41)	
≥30	21.93 (59/269)	0.83 (0.59–1.15)	
Smoking habit			
Never smoker	22.26 (225/1011)	1	1
Former smoker	33.73 (112/332)	1.78 (1.36–2.33)	1.39 (1.00–1.93)
Active smoker	28.05 (92/328)	1.36 (1.03–1.81)	1.19 (0.84–1.68)
Frequency of lack of compliance with medication			
Never	20.66 (131/634)	1	1
Occasionally	28.68 (298/1039)	1.54 (1.22–1.95)	1.20 (0.89–1.61)
Alcohol consumption			
≤22.5 g	23.28 (162/696)	1	1
>22.5 g	29.60 (238/804)	1.39 (1.10–1.75)	1.29 (0.98–1.69)
Educational level			
Primary or no studies	24.06 (166/690)	1	
High school or university	26.86 (263/979)	1.16 (0.93–1.45)	
Living environment			
City	24.65 (249/1010)	1	
Village	27.15 (180/663)	1.14 (0.91–1.42)	
Stressful event in the last 15 days			
No	22.95 (324/1412)	1	1
Yes	40.94 (104/254)	2.33 (1.76–3.08)	1.93 (1.38–2.69)
Therapy compliance (physician's perception)			
Normal, high, or total	24.19 (334/1381)	1	1
Very poor or poor	32.53 (95/292)	1.51 (1.15–1.99)	1.01 (0.71–1.45)
Importance of compliance (patient's perception)			
<8	26.28 (108/411)	1.04 (0.81–1.34)	
≥8	25.46 (321/1261)	1	
Baseline severity of asthma			
Intermittent or mild	19.18 (211/1100)	1	1
Moderate or severe	38.11 (218/572)	2.59 (2.07–3.25)	1.38 (1.03–1.84)
Type of therapy			
Only SABA and/or LABA	18.06 (41/227)	1	1
OCS	36.17 (34/94)	2.57 (1.50–4.41)	0.47 (0.23–0.92)
LABA + ICS	26.89 (309/1149)	1.67 (1.16–2.40)	0.76 (0.49–1.18)
Only ICS	23.63 (43/182)	1.40 (0.87–2.27)	1.14 (0.65–2.00)
Hospital admission			
No	22.95 (362/1577)	1	1
Yes	69.79 (67/96)	7.75 (4.93–12.17)	2.47 (1.44–4.22)
Visits to the emergency service			
No	12.64 (135/1068)	1	1
Yes	48.60 (294/605)	6.53 (5.13–8.31)	4.18 (3.14–5.57)
Visits to primary care physician			
No	4.21 (4/95)	1	1
Yes	26.95 (425/1577)	8.39 (3.06–22.97)	5.72 (1.73–18.87)
ACQ			
No	35.33 (365/1033)	1	1
Yes	10.00 (64/640)	4.92 (3.69–6.56)	2.32 (1.65–3.26)

Notes. BMI, body mass index; LABA, long-acting beta-2 agonist; SABA, short-acting beta-2 agonist; ICS, inhaled corticosteroids; OCS, oral corticosteroids; ACQ, asthma control questionnaire; Crude OR, coefficients are expressed in relation to the other categories for each variable.

^aAdjusted for all variables included in the column.

absenteeism observed among former smokers (21, 29, 30) were described in studies on other populations.

In our population, patients with the most severe asthma are shown to have a higher probability of absenteeism,

although different results have been reported in the literature. Some authors suggest a loss of work productivity in patients with more severe asthma (17, 21, 26, 28, 30–32), whereas other authors do not (5, 24, 33, 34).

Some of these differences can be explained by the methodology used in these studies, because important differences have been observed in the criteria used for classifying asthma severity in the observed populations and in the way of assessing work productivity.

In the article by Yelin, that included asthmatic patients from North California, no relationship between the patient's educational level and his or her occupational status was observed; these results are consistent with our findings (24). On the contrary, most authors have found that patients with a higher level of education have a better work situation (5, 7, 21, 28, 30, 32, 33, 35). Besides the differences in the population studied, some authors only include patients with occupational asthma (28, 33). Other factors that we have not evaluated, such as the type of work performed or the kind of social health system, could influence these results (24). Finally, asthma patients' choice of profession or occupation could have an impact on absenteeism, because these patients would tend to avoid jobs with exposure to known occupational asthma triggers (36).

The potential associations of age and sex on occupational performance, which do not appear to influence our results, are debatable, with contradictory results found among different publications (5, 21, 24–28, 35).

This study has some limitations. First, as it is a cross-sectional study, the results provide information on association, but not on causality. In addition, the selection of patients has not been strictly at random, although given the size of the population sample studied, as well as the participation of more than 182 primary care physicians nationwide, it seems likely that the results reflect the reality in Spain.

As for the diagnosis, patients included in this study had a medical diagnosis of asthma with follow-up for more than 1 year since the time of diagnosis, although confirmation through complementary tests was not required. Thus, in some cases, this might have led to a misclassification (37). Moreover, this does not enable us to identify factors that could have an impact on the occupational life of these patients, such as occupational asthma or work-related asthma, not to mention the "healthy worker" effect, which cannot be ruled out (36).

Finally, the source of our data on patients' time off work was from the patients themselves (self-reported), without being confirmed by a review of the occupational activity records, although after assessing this methodology, it has been shown that the self-reported work incapacity is a reliable reflection of the actual work ability (26). Furthermore, this information was collected by the family physicians, who, in our health system, are assigned the task of signing the start and end of temporary incapacity for work; therefore, reviewing the hospital registers would not provide further information on absenteeism periods.

It is important to note that there was no incentive for patients to report or deny work limitations, given that the study population was recruited independently of any disability or reimbursement mechanism.

In conclusion, asthma has an important effect on absenteeism in our country; more than one-fourth of Spanish asthmatics who visit a primary care center experience an episode of occupational disability related to their disease at some time during the year; going to a doctor or admission to a hospital are the main determining factors of occupational activity loss among asthmatics. Decreasing smoking prevalence and improving asthma control, both of which can be easily addressed in our health-care system, should reduce work disability among asthma patients.

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DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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