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Dates: Received: 11 July, 2015; Accepted: 16 March, 2016; Published: 18 March, 2016

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ISSN: 2581-3684

www.peertechz.com

Keywords: Asthma; Anxiety; Depression; Transversal; Descriptive; Mental health

Research Article

Asthma, Anxiety and Depression are they walking together? Cross-Sectional Descriptive Study

Abstract

Background/Objectives: The association between asthma and mental health disorders is well known, both anxiety and depression being the most common ones. The aim is to determine the proportion of anxiety and/or depression in an asthmatic population compared to a non-asthmatic one in a Primary Care centre. Secondary objectives: Assess the association between the severity of asthma and its level of control and anxiety and/or depression.

Methods: Cross-sectional descriptive study, 317 patients diagnosed of asthma and 306 without asthma, aged between 17 to 70 years old, recruited from a primary care centre. Goldberg test was performed to detect anxiety and/or depression. Other variables analysed were: age, sex, previous diagnosis of anxiety and/or depression, associated chronic diseases, type of asthma and degree of its control.

Results: 70% of the people in the asthmatic group were women and 52% in the non-asthmatic group. The mean age was of 43 (SD 16.89) and 48 (SD 14.09) years old, respectively. 57.1% had intermittent asthma. 62.7% of asthmatics had good control. Goldberg test in the group of asthmatic patients showed 51.1% ($p = 0.0001$) of anxiety and 57.4% ($p = 0.0001$) of depression. The results were adjusted for age and sex maintaining the association between asthma and anxiety with an OR = 1.8 (95% CI: 1.3-2.6) and depression OR = 2.1 (95% CI: 1.5 to 3.0). Patients with a higher level of asthma control had less anxiety ($p = 0.002$) and depression ($p = 0.004$).

Conclusions: Asthmatic patients had more anxiety and depression. Higher asthma control was associated with less anxiety and depression.

Introduction

Asthma is a chronic inflammatory disease characterized by inflammation of the airway in which there is a wide variety of stimuli that can trigger subsequent hyperresponsiveness and consequently bronchial obstruction, which leads to dyspnoea, cough and wheezing. This first definition refers to GINA 2006. Although the latest definition according to GINA 2014 is the following: Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. Is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity together with variable expiratory airflow limitation [1,2].

Asthma is a very common disease, although underdiagnosed, with wide geographical variation, being more prevalent in urban areas. According to data published by the World Health Organization (WHO), asthma could now be affecting between 100 and 150 million people, with an annual direct mortality of 2 million. The European Asthma Study [3], which analysed the prevalence of this disease in five Spanish provinces, including adults aged between 20 to 44 years old, showed there was a 1% rate in the province of Huelva, 1.1% in Galakao, 1.7% in Oviedo. Being Barcelona 3,5% and Albacete 4,7% the ones with higher prevalence.

Asthma is a potentially fatal disease. Though thanks to the pharmacological advances in the last two decades, amongst other factors, it has become a chronic disease where a good control allows

patients to have a high quality of life. At this point, health professionals play an important role.

Moreover, the association between asthma and mental health disorders is well known. Other chronic diseases such as heart disease, hypertension or diabetes mellitus have also been related to mental health disorders during decades. Several studies have shown the relation between this respiratory disease and the presence of psychiatric comorbidity [4-15], but a few were performed in primary care [16]. In a study carried out in Barcelona city's primary care area [17,18], with a sample of 338 asthmatic patients older than 14 years old, it was observed that 31% of the patients were diagnosed of some kind of psychiatric disorder.

43.5% of asthmatics had a depressive disorder, and 40.6% an anxiety disorder. Somatophorm and bipolar disorders obtained lower percentages (3,9 and 0,8% respectively). Likewise, patients with severe asthma had a higher prevalence of mental health disorders ($p = 0.001$), more exacerbations ($p = 0.005$), and required more rescue medication ($p = 0.053$). According to these results, the quality of life of asthmatic patients seems to be related to mental health comorbidity, particularly with anxiety and depression [18,19]. For this reason we decided to perform this study. Achieving an optimal level of symptoms is considered to have a potential impact on the basic activities of daily living. Besides, there are no studies in Spain that assess this association in primary care.

The basic aim of the study was:

- To see whether the association between asthma and anxiety and/or depression exists or not.

Secondary objectives:

- To assess the association between asthma severity and the presence of anxiety and / or depression.
- To assess the association between the degree of asthma control and the presence of anxiety and / or depression.

Methods

This is a cross-sectional descriptive study performed in a Barcelona city primary care centre, neighbourhoods comprising Trinitat Nova and Prosperitat. With 14,951 people assigned older than 15 years old with a socio-economic medium-low level.

The asthmatic group collects patients between 17 and 70 years old assigned to the centre and diagnosed of asthma at least one year before the beginning of the study, CIM-10 code J45 (N = 536). Patients were recruited consecutively from a list of patients with this diagnosis.

From a total of non-asthmatic patients (N = 14 415), a randomized selection was made obtaining a list of 536 patients aged between 17 and 70 years old, where those who met the inclusion and exclusion criteria were recruited consecutively.

Accepting an alpha risk of 0.05 and a beta risk below 0.2 in a bilateral contrast, 365 subjects in the first group (asthma) and 365 in the second (non-asthmatic) are needed to detect a statistically significant difference between two proportions (percentage of anxiety and / or depression), expecting it to be 30% in the asthmatic group [18] and 20% in the non-asthmatic group. Loss rate of follow up of 20% has been estimated. The ARACSINUS approach was used. Calculated with the Granmo program, version 6.0.

Exclusion criteria: refusal to participate, not locating the patient after 7 telephone attempts at different times, the presence of dementia, severe psychiatric disorders (such as schizophrenia, bipolar disorder...), mentally handicapped, terminal cancer, chronic obstructive pulmonary disease (COPD) and/or language barrier. In the asthmatic group: to have severe asthma diagnosis, because in most cases the follow-up is made in the hospital.

The following variables were collected for all patients included in the study:

- Age
- Sex
- Smoking status: divided into three categories (smoker, non smoker and ex-smoker). For smokers was recorded the number of packets per year: continuous numeric variable. The ex-smoker category was defined as patients who had stopped smoking at least one-year prior.
- Associated chronic pathologies among the 10 most prevalent in the area according to the computer record: hypertension, diabetes, dyslipidaemia, atrial fibrillation, acute myocardial

infarction, glaucoma, cataracts, osteoporosis, back pain and osteoarthritis.

- Psychiatric disorder associated: divided into three categories (anxiety, depression or both), depending on the diagnosis registered.
- Goldberg Test Scores: Anxiety and depression scales.
- Some variables were added to the asthmatic patients:
- Presence of allergic rhinitis
- Number of hospital admissions related to asthma in the past three years.
- Number of exacerbations in the past three years.
- Baseline treatment of asthma: stratified by categories (none, inhaled short-acting beta-2-adrenergic agonists, inhaled long-acting beta-2-adrenergic agonists, inhaled corticosteroids: stratified according to low, medium or high doses, oral corticosteroids, anti-leukotriens, theophylline, anticholinergics, chromones, etc.). Not mutually exclusive.
- Asthma severity: divided into three categories according to 2007 GINA's guidelines (intermittent, mild persistent and moderate persistent asthma).
- Degree of asthma control: divided into three categories according to 2007 GINA's guidelines (controlled, partly controlled or uncontrolled).

In order to assess the possible relationship between asthma and anxiety and / or depression, the Goldberg test (Spanish version) was performed [20-22]. It is an anxiety and depression screening test. It consists of 18 questions divided into two scales: anxiety and depression, 9 questions each. Each affirmative answer is one point. In terms of interpretation, the cut-offs are:

- Greater or equal to 4 for anxiety
- Greater or equal to 2 for depression

To homogenize the sample and facilitate the participation of patients that often do not come to the centre, the test was questioned by telephone.

Data was analysed with SPSS for Windows version 17. Quantitative variables with central tendency measurements and confidence intervals were calculated. Qualitative adjustment techniques were performed (logistic regression) for categorical variables or percentages to control possible confounders. Comparisons between qualitative variables were performed using Jhi-square test and quantitative variables by Student t test. P values ≤ 0.05 were considered statistically significant (Figure 1)

Results

After applying the inclusion and exclusion criteria, from a total of 536 asthmatic patients, data was obtained from 317 patients from this group and 306 patients without asthma.

It was seen in the descriptive analysis that 70.3% of asthmatic

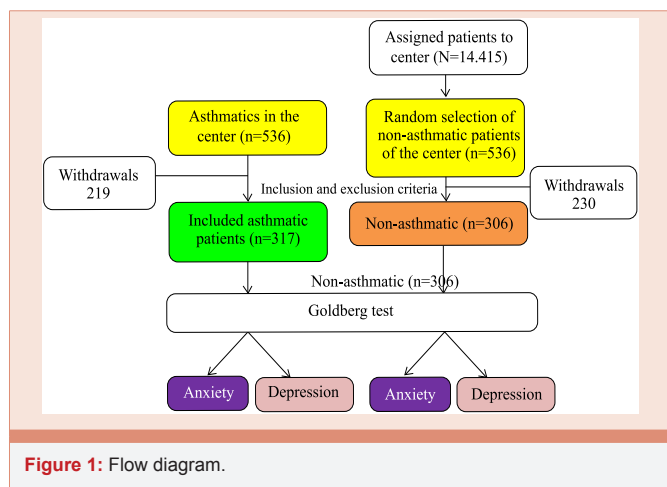


Figure 1: Flow diagram.

Table 1: Comparison between both populations regarding sex, age, presence of comorbidities, and smoking habit. Values are expressed in mean ± standard deviation for quantitative variables and percentage for qualitative variables.

Gender	Non-asthmatic (n=306)	Asthmatic (n=317)	P
Male	48,7% (43,1-54,3)	29,7% (24,6-34,7)	<0,0001
Female	51,3% (45,7-56,9)	70,3% (65,3-75,4)	
Age	47,98 (SD 14,09)	42,67 (SD 16,89)	<0,0001
≥2 Comorbidities	24,5%	18%	0,046
Smoking habit: (n=578)	92 (33,9%) 23,57 (SD 22,57) (17,22-29,9) n= 51	70 (22,8%) 10,54 (SD 10,82) (7,81-13,26) n=63	0,003 <0,0001
- Smoker: Packets/year	142 (52,4%)	196 (64,1%)	0,005
- Non-smoker	37 (13,7%)	40 (13,1%)	0,903
- Ex-smoker			

Table 2: Comparison within the 10 most frequent comorbidities in primary care between the non-asthmatic and asthmatic population. Values are expressed as percentage. There were no significant differences in comorbidities among both groups.

	Non-asthmatic (n=306)	Asthmatic (n=317)	P
Hypertension	70 (23%)	66 (20,8%)	0,585
DM tipo 2	31 (10,2%)	18 (5,7%)	0,058
Hypercholesterolemia	59 (19,3%)	52 (16,4%)	0,348
Atria fibrillation	1 (0,3%)	1 (0,3%)	0,98
Acute myocardial infarction	8 (2,6%)	3 (0,9%)	0,136
Glaucoma	4 (1,3%)	6 (1,9%)	0,752
Cataracts	8 (2,6%)	2 (0,6%)	0,059
Osteoporosis	12 (3,9%)	12 (3,9%)	1
Back pain	39 (12,7%)	45 (14,5%)	0,64
Osteoarthritis	21 (6,9%)	34 (10,7%)	0,092

Table 3: Characteristics of asthmatic patients. Variables expressed in percentage.

Asthmatic patients characteristics (n=317)	
Asthma severity:	
Intermittent	181 (57,1%)
Mild persistent	53 (16,7%)
Moderate persistent	83 (26,2%)
Level of asthmatic control (n=316)	
Controlled	198 (62,7%)
Partly controlled	74 (23,4%)
Non controlled	44 (13,9%)
Associated allergic rhinitis	
Yes	115 (36,3%)
Treatment (n=316)	
No	154 (48,7%)
Yes:	162 (51,3%)
Inhaled short-acting Beta-2- adrenergic	94 (58%)
Inhaled long-acting Beta-2-adrenergic	78 (48,1%)
Inhaled corticosteroids	130 (80,2%)
Low dose	30 (23,1%)
Medium dose	71 (54,6%)
High dose	29 (22,3%)
Oral corticosteroids	4 (2,5%)
Antileucotriens	31 (19,1%)
Others	25 (15,4%)

patients were women compared to 51.3% in the group control ($p < 0.0001$). The mean age of the asthmatic group was 42.67 years old (95% CI 40.80 to 44.54) and in the non-asthmatic, 47.98 (95%: 46.4 to 49.56) ($p < 0.0001$). Patients from the non-asthmatic group presented two or more comorbidities associated more frequently than in the asthmatic group, being the difference significant. The 33.9% of non-asthmatic patients smoked compared to 22.8% of patients with asthma (Tables 1,2).

Asthmatic patients were classified according to its severity and the degree of its control according to 2007 GINA's guidelines¹. After the classification, 57.1% of the patients had intermittent asthma, 62.7% of which were well controlled (Table 3).

Of all patients included in the study, 43% (95% CI 39.1% -46.9%) were positive for anxiety according to the Goldberg test and 48.3% (95% CI 44,4% -52.2%) for depression. 35.3% of them (95% CI 31.6% -39.1%) were positive for both anxiety and for depression.

Participants who were positive for depression according to Goldberg's test, about 24.6% had a previous diagnosis of depression. From the ones positive for anxiety, about 35.1% had previous diagnosis of anxiety. To evaluate the relationship between the diagnosis of anxiety and depression recorded in the computer and Goldberg test, we used the kappa index (0.207 and 0.172 for anxiety and depression respectively).

Regarding to distributions between men and woman, 70.89% of 268 patients positive for anxiety in Goldberg's test and 68,77% of 301 positive for depression, were women. The difference compared to men was statistically significant ($p < 0.001$). On the other hand, from the asthmatic patients group, 79% out of 128 positive for anxiety and 74% out of 135 positive for depression were woman, being the first result statistically significant compared to the percentage of men ($p=0,001$) and the second one not ($p=0,106$).



In the non-asthmatic group, the percentage of women was 58.5% for anxiety ($p = 0.072$) and 60.5% for depression ($p = 0.014$). Of all patients previously diagnosed of depression according to the computer record ($n = 99$), 80.8% were women ($n = 80$). From the ones previously diagnosed of anxiety ($n = 149$), 73.8% ($n = 110$) were women. Both obtaining statistical significance compared to men ($p < 0.001$). In reference to the results, there were 95 patients positive for anxiety according to Goldberg's test in the asthmatic group and 65 in the non-asthmatic. From those, 76,8% ($n=73$) in the first group and 84,6% ($n=55$) from the second one, were women.

From all the smoking patients included in the study, 50.6% had anxiety and 51.2% depression. 57,1% of the smoking asthmatic patients and 45,6% of the non-asthmatic smokers had anxiety ($p = 0,157$). Regarding depression, 61.4% of asthmatic smokers had a positive test compared to 43.5% of non-smoking patients with asthma ($p = 0,027$).

A positive result in Goldberg's test for anxiety was seen in 51,1% of the asthmatic patients, and 34,6% in the non-asthmatic. On the other hand, 57.4% of asthmatic patients gave positive for depression compared to 38.9% of the patients without asthma. 43.8% of asthmatics and 26.5% of non-asthmatics had both anxiety and depression. To determine whether there was an association between asthma and anxiety and/or depression, Jhi-square test was used, which showed that there was an association between asthma and anxiety and/or depression ($p < 0.0001$). Logistic regression was performed to test whether the association remained after adjusting age, sex and presence of comorbidities. Anxiety's OR was 1.8 (95% CI: 1.3-2.6) and depressions' 2.1 (95% CI: 1.5-3).

The diagnosis of anxiety was present in the computer program in 30% of asthmatic patients, compared to a 17.6% in the non-asthmatics ($p < 0.0001$). On the other hand, 20.5% of asthmatic patients were diagnosed of depression compared to 11.1% of non-asthmatic patients ($p < 0.001$).

To assess the association between asthma severity and the probability of increased anxiety and/or depression according to Goldberg's test a linear association analysis was performed, with no significant differences observed.

In relation to the degree of asthma control and the presence of psychiatric comorbidities according to Goldberg's test 43,3% of the asthmatic patients with good control, 66.2% with partial control and 61,4% with poor control, had anxiety, being these differences between groups significant ($p = 0.002$). On the other hand, depression was positive in 51% of patients with well-controlled asthma, 66,2% with partial control and 70.5% with poor control. The difference between groups was also significant ($p = 0,004$).

Discussion

Main findings

Patients with asthma presented more anxiety and depression than patients without it. On the other hand, a higher level of asthma control was associated with a lower incidence of anxiety and depression. In contrast, no significant differences were found between asthma severity and the presence of psychiatric comorbidities

Strengths and limitations

- The selection of the non-asthmatic patient group did not take into account the distribution of the asthmatic group. This potential problem was solved in the analysis adjusted for age, sex, and comorbidities, using logistic regression.
- The results cannot be extrapolated to patients with severe asthma because we did not include them in the study.
- It is not a multicentre study, which could give more power to the study and increase the external validity. To resolve this, the research team is developing new studies in this line.

Interpretation of findings in relation to previously published work

First of all, there is not much work published regarding anxiety and depression related to asthma in an adult population from a primary care setting in Spain (9). Espinosa et al. conclude in their study that anxiety is more common than depression between asthmatic patients (they used the HAD test to assess anxiety and depression).

Furthermore, the predominance of women seen in the asthmatic group should be noted. In Spain, it is estimated that 52.9% to 63.9% of asthmatic patients are women [23-25].

It has been reported that the smoke of cigarettes is associated with a poor clinical management of the disease [26,27] and a higher prevalence of psychiatric comorbidity [28], although our study was only observed in the case of depression.

In Spain, the prevalence of depression is about 10% and anxiety's 10-15% [29]. Anxiety has higher prevalence among females. Coinciding with other studies [27,30-34], we also observed greater psychiatric comorbidity in women.

Janson et al., conclude that there is an association between mood and the presence of asthma exacerbation and sensation of breathlessness, with no significant differences in terms of the pathology's objective variables [36]. Rimington et al., made a study evaluating asthmatic patients in primary care comparing urban and suburban populations and concluded that patients belonging to the first have more anxiety and depression as a predictor of asthmatic patient symptomatology [34,35].

The correlation between presence of asthma and anxiety and/or depression can be explained from various points of view: at first, mood disorders may increase the perception of respiratory symptoms and therefore reduce pathology control. Some studies also suggest that there could be a relation between asthma and personality disorders (PD) (especially obsessive-compulsive and avoidance PD) [36]. Results from the World Mental Health Surveys confirm the relations between asthma and mental disorders.

Furthermore, poorly controlled asthma, with daily symptoms and frequent use of rescue medication, could lead to greater psychological stress that could be manifested as anxiety and/or depression. Longitudinal studies have confirmed that the association between asthma and psychiatric comorbidities are maintained over time [19,31], a fact not analysed in our study.

In contradiction to a study made by Fernandes et al. [30], but coinciding with Feldman et al. [34], in our country there were no significant differences between asthma severity and the presence of greater association with psychiatric comorbidities. The discrepancy with the first results could be due to the first one taking place in a hospital where 66.2% of asthmatic patients included were severe persistent type. However, our study did not include these patients. Also according to Valença AM et al, asthma's severity is independent and does not correlate with a higher increase of anxiety and depression [37].

Implications for future research, policy and practice

Future research will be led to make a multicentre study with a wide enough representative population, so data can be extrapolated to the city's asthmatic patients. Also future research will include persistent severe asthmatic patients making the sample more complete.

Conclusion

The main conclusion of the study is that patients with asthma presented more anxiety and depression, which correlates with known data. As most of chronic diseases do.

On the other hand, a higher level of asthma control was associated with a lower incidence of anxiety and depression. By contrast, no significant differences were found between asthma severity and presence of psychiatric comorbidities.

Finally, we must bear in mind that anxiety and depression cause deterioration in social relationships and quality of life, and also correlates with subjective dyspnoea levels and disease progression. Therefore, early detection of depression and/or anxiety in patients with chronic respiratory diseases is of great importance and we need to suspect them from primary care.

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Citation: Flor-Escriche X, Poblet-Cortés R, Lamarca-Fornell L, Mendez-Gomez J, Álvarez-Álvarez S, et al. (2016) Asthma, Anxiety and Depression are they walking together? Cross-Sectional Descriptive Study. *Arch Pulmonol Respir Care* 2(1): 010-015. DOI: <http://dx.doi.org/10.17352/aprc.000009>