Original Article

Comparing asthma and chronic obstructive pulmonary disease in terms of symptoms of anxiety and depression*

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Abstract

Objective: To evaluate the presence and severity of symptoms of anxiety and depression in individuals with asthma or chronic obstructive pulmonary disease. **Methods:** In order to evaluate symptoms of anxiety and depression, specific instruments of quantification (the State-Trait Anxiety Inventory and the Beck Depression Inventory, respectively) were administered to patients at an outpatient clinic for the treatment of asthma and chronic obstructive pulmonary disease. The population comprised 189 randomly and prospectively selected patients that were divided into three study groups (each with a different therapeutic objective): 40 patients with controlled asthma, 100 patients with uncontrolled asthma, and 49 patients with chronic obstructive pulmonary disease. Included among the variables studied, as part of the methodology, were symptoms of anxiety and depression. The data obtained were compared taking into consideration demographic and functional aspects, as well as the severity of the symptoms of anxiety and depression. **Results:** Among the asthma patients, the prevalence of moderate or severe anxiety was significantly higher than that observed among those with chronic obstructive pulmonary disease ($p < 0.001$). The uncontrolled asthma group presented significantly higher rates of depressive symptoms than did the controlled asthma group ($p < 0.05$). **Conclusion:** The frequency of symptoms of anxiety and depression is greater among asthma patients than among patients with chronic obstructive pulmonary disease, which can make clinical control difficult.

Keywords: Anxiety; Depression; Asthma; Pulmonary disease; Chronic obstructive.

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Introduction

Patients with chronic diseases present greater predisposition to psychiatric disorders when compared with the population in general.[1] Patients with rheumatoid arthritis, arterial hypertension, lower back pain, cardiopathy, and diabetes mellitus frequently report concomitant depressive symptoms.[2-4] Patients with chronic lung diseases present a high frequency of mood disorders and anxiety disorders.[5]

The prevalence of depression in the population in general is approximately 3%, increasing to 10% among the population treated at health care facilities.[6] Among patients with chronic obstructive pulmonary disease (COPD), the prevalence of depression ranges from 6% to 42%.[7] This inconclusive variation was endorsed by a recent systematic review on the prevalence of depression in patients with COPD, and the conclusion was that the methodological quality of most of the studies was poor.[7]

The prevalence of anxiety disorders in the general population is approximately 20%.[8] Among patients with COPD, the prevalence of anxiety disorders also varies widely (from 21% to 96%), as a result of the methodology chosen and of the characteristics of the population investigated.[9]

In addition, it is known that there is a very close correlation between anxiety and depression: some authors consider these manifestations mirror images of each other.[10]

Among patients with asthma, a recent study found a prevalence of 30% for anxiety and of 9% for depression.[11] The literature shows that the anxiety and depression components are factors principally associated with difficult-to-treat asthma.[12] In addition to the increase in respiratory frequency and amplitude caused by anxiety, we should add the clinical profile of asthma, amplifying the symptoms of dyspnea.

In studies on health-related quality of life in patients with asthma or COPD, the quantification of symptoms of depression and anxiety is recommended, due to their influence on the low scores of quality of life found.[13,14]

As part of the methodology of three clinical studies, patients with asthma or COPD were submitted to the quantitative evaluation of anxiety and depression symptoms. In this study, we carried out a comparative analysis of the results obtained.

Methods

We analyzed specific instruments designed to evaluate symptoms of anxiety and depression, administered to outpatients treated at the Asthma Outpatient Clinic and COPD Outpatient Clinic of the Pulmonology Department of the University of São Paulo School of Medicine Hospital das Clínicas. The sample studied comprised 189 patients (140 patients with asthma and 49 with COPD), selected randomly and prospectively.

The patients were classified as suffering from asthma or COPD according to the Brazilian Consensus on Asthma and COPD. All of the patients had previously been submitted to clinical evaluation and pulmonary function tests. Forced expiratory volume in one second, as determined through spirometry, had been periodically recorded over the preceding six months. All spirometry techniques were performed according to the standards of the American Thoracic Society.[15]

The first group comprised 40 patients with clinically controlled asthma. The patients were evaluated with the objective of determining the additive beneficial effects of respiratory therapy. All of these patients had moderate persistent asthma and were under regular treatment with inhaled corticosteroids and long-acting bronchodilators. They were considered controlled because they had not presented worsening of asthma symptoms in the past month. The second group studied comprised 100 patients with partially-controlled or uncontrolled asthma, most suffering from moderate and severe persistent asthma. They were selected for a cross-sectional analysis of asthma-related risk factors. The third group comprised 49 stable patients with COPD but without recent exacerbation. The objective of the study was to relate dyspnea to pulse oximetry measurement during exertion. All the studies were approved by the Ethics in Research Committee of the University of São Paulo School of Medicine Hospital das Clínicas.

The depressive symptoms were evaluated using the Beck Depression Inventory (BDI) questionnaire.[16] The BDI is a self-evaluation depression measurement translated into various languages and validated for use in various countries (including Brazil). The questionnaire consists of twenty-one multiple-choice questions, each with four options, graded from 0 to 3, a score of 3 indicating the greatest severity of

depression. The result is obtained by totaling the scores for the individual questions, and the overall score (maximum of 63 points) is considered the final result. The severity of the depressive symptoms was classified as follows: 10–18 points = mild; 19-29 points = moderate; ≥ 30 points = severe.[16]

The anxiety symptoms were evaluated using the State-Trait Anxiety Inventory (STAI) proposed by Spielberger in 1970, which has been translated to and standardized for use in Portuguese.[17] This instrument consists of two self-evaluation scales designed to evaluate, separately, the concepts 'trait anxiety' and 'state anxiety'. The trait anxiety scale determines the personality of the individual in potentially threatening situations over the course of their lifetime. The state anxiety scale evaluates a transitory (momentary) state, in which unpleasant feelings of tension and the intensity variable depend on the situation encountered. Each scale contains twenty questions, and the possible score for each question is from 1 to 4 points. The overall score on each scale (maximum of 80 points) is evaluated according to the criteria established by its inventor. Severity is classified as follows: > 30 points = moderate anxiety; and > 50 points = severe anxiety.[17] The analysis of the values of state anxiety is used to compare the groups, since it represents the symptoms of anxiety at the moment of the evaluation (cross-sectional).

The groups of patients were compared according to their demographic and functional aspects, as well as in terms of the mean anxiety and depression scores, using one-way ANOVA. For the statistical analysis of the STAI and BDI tests, we considered the overall percentage of the combined scores for both questionnaires, the maximum (80 points on the STAI and 63 points on the BDI) corresponding to 100%. It is understood that a higher score indicates greater severity. In addition, we evaluated the proportion of patients with no symptoms or mild symptoms, comparing them to the proportion of those presenting moderate or severe symptoms (BDI: < 19 points; STAI: < 30 points). The intragroup correlation of the BDI and STAI values obtained was obtained using Spearman's test. Values of $p < 0.05$ were considered significant.

Results

The population of patients with asthma consisted predominantly of women, and the asthma patients were, as a group, younger than those with COPD. The mean determined for forced expiratory volume in one second was approximately 70% of predicted in the patients with asthma, whereas it was below 40% of predicted in the patients with COPD. In Table 1, the demographic data shows that the patients with asthma (controlled or uncontrolled) presented a mean STAI score that was significantly higher than that presented by the group with COPD. The mean BDI score was between 20 and 30% of the maximum. A small, albeit significant, percentage difference was found for the uncontrolled asthma group in terms of depression, the severity of which was greater in this group than in either of the two other groups.

As can be seen in Table 2, the analysis stratified by severity did not show a significant difference in relation to the levels of depression. However, regarding anxiety, the prevalence of moderate and severe anxiety was significantly higher among the patients with uncontrolled asthma and the patients with controlled asthma than among those with COPD ($p < 0.05$ and $p < 0.001$, respectively).

There was an intragroup correlation between the STAI and BDI scores. This correlation was stronger in the group with COPD ($r = 0.63$, $p < 0.001$) than in the controlled and uncontrolled asthma groups ($r = 0.57$ and 0.53, $p < 0.001$, respectively).

Discussion

Our results demonstrate that a high percentage of patients with obstructive lung diseases present symptoms of anxiety or depression. The patients with asthma presented a higher percentage of

Table 1 - Demographic characteristics and scores on scales designed to assess anxiety and depression in patients with controlled asthma, uncontrolled asthma or COPD.

	CA	UA	COPD
n	40	100	49
male/female	10/30	20/80	27/22
Age (years)	43 ± 12	43 ± 15	63 ± 7*
FEV_1 (% predicted)	75 ± 20	66 ± 24	37 ± 14*
STAI (%)	57 ± 12	60 ± 14	46 ± 12*
BDI (%)	23 ± 15	32 ± 20**	24 ± 16

Values expressed in means (standard deviation); *$p < 0.001$; **$p < 0.05$; CA: controlled asthma; UA: uncontrolled asthma; COPD: chronic obstructive pulmonary disease; FEV_1: forced expiratory volume in one second; STAI: State-Trait Anxiety Inventory; BDI: Beck Depression Inventory.

Table 2 - Severity of anxiety and depression in patients with controlled asthma, uncontrolled asthma or COPD.

	CA (n = 40)	UA (n = 100)	COPD (n = 49)
		n (%)	
STAI			
absent/low (< 30 points)	1 (2.5)	7 (7)	13 (26)
moderate/severe (30–50 points)	39 (97.5)**	93 (93)*	36 (74)
BDI			
absent/mild (< 18 points)	32 (80)	51 (51)	35 (71)
moderate/severe (19–29 points)	8 (20)	49 (49)	14 (29)

*p < 0.001; **p < 0.05; CA: controlled asthma; UA: uncontrolled asthma; COPD: chronic obstructive pulmonary disease; STAI: State-Trait Anxiety Inventory; BDI: Beck Depression Inventory.

psychiatric symptoms (greater emotional impairment). The most relevant finding was that symptoms of anxiety were significantly more common among the patients with asthma. Nevertheless, the mean percentage of depressive symptoms was comparable between the asthma group and the COPD group.

These results seem to indicate that the patients with higher degree of pulmonary obstruction, as determined by measuring forced expiratory volume in one second, i.e., those with COPD, present fewer symptoms of anxiety and depression. Similarly, there seems to be no correlation with age, although elderly patients present a greater tendency to suffer from depressive symptoms.[18]

Gender might be a determining factor. In the asthma group, there were 110 females (78.6%), compared with 22 (45%) in the COPD group. The prevalence of depression and anxiety symptoms is higher among females.[19] In addition, gender can be a predictive factor of depression, after the manifestation of one of the primary anxiety disorders at some point.[19] The significant correlation between anxiety symptoms and depression symptoms found in the present study indicates the parallelism of these manifestations.

Studies have shown that the prevalence of psychiatric disorders and psychosocial problems IS high (e não IF HIGH) among asthma patients, suggesting a possible association between the severity of asthma and psychological incapacity.[20] Among these disorders, panic disorder is the one most often associated with asthma.[21]

Asthma severity can be directly correlated with the symptoms of anxiety and depression, as it is with high doses of inhaled corticosteroids [22] and, inversely, with the health-related measurements of patient quality of life. Some authors have found that asthma severity correlates negatively with the scores obtained using a 'Q' Questionnaire designed to determine the level of control of the asthma symptoms in the past week, as well as with those obtained using the Hospital Anxiety and Depression scale and the Asthma Quality of Life Questionnaire.[11] The Hospital Anxiety and Depression scale score was also found to correlate negatively with forced expiratory volume in one second and with peak expiratory flow.[11]

In certain studies, relationships among asthma, depressive symptoms and treatment compliance have been observed. Some authors[23] showed that patients with asthma who were noncompliant with treatment had a significantly higher score for depression than did those who were compliant with treatment. In the present study, the patients with uncontrolled asthma presented a slightly higher percentage of depression symptoms, which might indicate low compliance with the maintenance treatment prescribed.

Other authors[24] showed that the number of emergency room visits for obstructive pulmonary diseases correlates with anxiety and depression. The patients with obstructive pulmonary diseases who returned to the emergency room within a month, due to exacerbations, presented significantly higher anxiety and depression scores than did those who maintained their respiratory symptoms under control. Observing the groups separately, they determined that the patients with asthma who had a crisis in the first month presented the highest Hospital Anxiety and Depression scale scores. The same tendency was seen in the patients with COPD, although the difference was not significant. In the present study, due to the small size of the sample, we could not reach a conclusion as to whether the relationship between the psychological factors and emergency treatment differed between the patients

with asthma and those with COPD. Other authors have found[25] anxiety to be the greatest predictive factor of the frequency of hospital admission for acute exacerbation in patients with COPD.

The methodologies used can influence the results.[7,9] In the present study, we used instruments that allowed us to stratify the psychological symptoms by severity and obtain a better evaluation in each group studied. Therefore, we could demonstrate that most patients with COPD present some level of depression and anxiety. It is certain that depression frequently occurs in patients with COPD. Some authors found that up to 42% of patients with COPD present depression.[26] In another study, the risk of depression was found to be 2.5-times greater in a group of patients with severe COPD than in a group of controls.[27] Those authors asserted that the explanation for a greater prevalence of depression is that such individuals present a psychological response to the limitations they face in everyday activities, which require greater effort due to their current incapacitating condition, as well as to the social deprivation resulting from those incapacitating symptoms.

Dyspnea is one of the symptoms that most limits patients with obstructive pulmonary diseases, and it can also be considered one of the most important factors in determining the severity of the disease and the health-related quality of life.[28] The severity of asthma, as evidenced by the presence of dyspnea, nocturnal awakenings and morning symptoms, correlates well with mood disorders and with the quality of life of these patients.[29] In the origin of dyspnea, there are various related factors, including hypoxemia, hypercapnia, increased respiratory effort and emotional alterations, such as anxiety and depression.[15] This might explain the finding in the current study that the prevalence of anxiety and depressive symptoms was higher in patients with uncontrolled asthma.

Some authors have tried to explain the etiology of such anxiety, suggesting that cerebral hypoxia resulting from hyperventilation is involved in the process.[27] It is well established that hyperventilation and hypersensitivity to carbon dioxide tension are part of the mechanism that triggers various types of anxiety disorders.[30] The profile seems to result from concomitant alterations in the respiratory system and in the brain system. Where this connection lies and in what form it occurs remain unknown.

The principal limitations of this study are related to the methodology. First of all, this study was outlined based on a selection of data from different patients evaluated at random, with distinct objectives. Included in the groups were patients with different degrees of asthma severity, which might have influenced (positively or negatively) the results. Second, the patients were not submitted to a psychiatric evaluation after the determination of the STAI and BDI values. Therefore, it was not possible to tell which individuals were actually psychiatric patients.

In conclusion, symptoms of anxiety and depression are common in patients with obstructive pulmonary diseases. This frequency seems to be greater among the patients with asthma than among those with COPD, independent of age and pulmonary function. The evaluation of these symptoms is important for the prognosis of the patient, since they can negatively affect treatment compliance and make it difficult to control the disease, as well as increasing morbidity and mortality. Few data on mood disorders in patients with asthma or COPD are available in the Brazilian literature. The results shown here indicate a tendency of our population of patients with chronic obstructive diseases. Future studies with more specific objectives can further the understanding of to what extent the symptoms of anxiety and depression aggravate the physical symptoms or vice versa, or even if the two factors act in a somewhat independent manner.

References

1. Forlenza OV, Vieira Fº AHG. Perturbações mentais associadas a doenças clínicas: diagnóstico, prevalência e considerações neurobiológicas. J Bras Psiquiatr. 1997;46(2):89-96.
2. Wells KB, Rogers W, Burnam A, Greenfield S, Ware JE Jr. How the medical comorbidity of depressed patients differs across health care settings: results from the Medical Outcomes Study. Am J Psychiatry. 1991;148(12):1688-96.
3. Bruce DG, Casey GP, Grange V, Clarnette RC, Almeida OP, Foster JK, Ives FJ, Davis TM; Fremantle Cognition in Diabetes Study. Cognitive impairment, physical disability and depressive symptoms in older diabetic patients: The Fremantle Cognition in Diabetes Study. Diabetes Res Clin Pract. 2003;61(1):59-67.
4. Soderlin MK, Hakala M, Nieminen P. Anxiety and depression in a community-based rheumatoid arthritis population. Scand J Rheumatol. 2000;29(3):177-13.
5. Nascimento I. Associação entre Transtornos de Ansiedade e Doenças Respiratórias (dissertação). Rio de Janeiro: Universidade Federal do Rio de Janeiro; 2000.
6. Bernik V. Depressão. RBM Rev Bras Méd. 999;56(5):347-64.

7. Van Ede L, Yzermans CJ, Brouwer HJ. Prevalence of depression in patients with chronic obstructive pulmonary disease: a systematic review. Thorax. 1999;54(8):688-92.
8. Bernik MA. Ansiedade. RBM Rev Bras Méd. 2002;59(9):621-4.
9. Godoy DV, Godoy RF. Redução nos níveis de ansiedade e depressão de pacientes com doença pulmonar obstrutiva crônica (DPOC) participantes de um programa de reabilitação pulmonar. J Pneumol. 2002;28(3):120-4.
10. Stoppe Jr A, Cordás TA. Depressão e Ansiedade. Rev Bras Med 2002; 59(4): 221-8.
11. Rimington LD, Davies DH, Lowe D, Pearson MG. Relationship between anxiety, depression, and morbidity in adult asthma patients. Thorax 2001;56(4):266-71.
12. Robinson DS, Campbell DA, Durham SR, Pfeffer J, Barnes PJ, Chung KF; Asthma and Allergy Research Group of the National Heart and Lung Institute. Systematic assessment of difficult-to-treat asthma. Eur Respir J. 2003;22(3):478-83.
13. Engstrom CP, Persson LO, Larsson S, Sullivan M. Health-related quality of life in COPD: why both disease-specific and generic measures should be used. Eur Respir J. 2001;18(1):69-76.
14. Nishimura K, Hajiro T, Oga T, Tsukino M, Ikeda A. Health-related quality of life in stable asthma: what are remaining quality of life problems in patients with well-controlled asthma? J Asthma. 2004;41(1):57-65.
15. Dyspnea mechanisms, assessment and management: a consensus statement. American Thoracic Society Am J Respir Crit Care Med. 1999;159(1):321-40.
16. Gorenstein C, Andrade LHG, Zuardi AW. Inventário de Depressão de Beck, Propriedades Psicométricas da Versão em Português. In: Gorenstein C, Andrade LHG, Zuardi AW, editores. Escalas de avaliação clínica em psiquiatria e psicofarmacologia. São Paulo: Ed. Lemos; 2000. p. 89-95.
17. Biaggio A, Natalício L F. Manual do Idate. Rio de Janeiro: CEPA; 1979.
18. Vargas HS. A Depressão no Idoso: fundamentos. São Paulo: Fundo Editorial Byk; 1992.
19. Parker G, Hadzi-Pavlovic D. Is the female preponderance in major depression secondary to a gender difference in specific anxiety disorders? Psychol Med. 2004;34(3):461-70.
20. Harrison BD. Psychosocial aspects of asthma in adults. Thorax. 1998;53(6):519-25.
21. Sociedade Brasileira de Pneumologia e Tisiologia. II Consenso Brasileiro no Manejo da Asma. J Pneumol. 1998; 24(4):213-4.
22. Bonala SB, Pina D, Silverman BA, Amara S, Bassett CW, Schneider AT. Asthma severity, psychiatric morbidity, and quality of life: correlation with inhaled corticosteroid dose. J Asthma. 2003;40(6):691-9.
23. Bosley CM, Fosbury JA, Cochrane GM. The psychological factors associated with poor compliance with treatment in asthma. Eur Respir J. 1995;8(6):899-904.
24. Dahlén I, Janson C. Anxiety and Depression are Related to the outcome of Emergency Treatment in Patients with Obstructive Pulmonary Disease. Chest. 2002;122(5):1633-37.
25. Yohannes AM, Baldwin RC, Connolly MJ. Depression and anxiety inelderly out patients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. Int J Geriatr Psychiatry. 2000;15(12):1090-6.
26. Gift AG, McCrone SH. Depression in patients with COPD. Heart Lung. 1993;22(4):289-97.
27. van Manen JG, Bindels PJE, Dekker FW, Yzermans CJ, van der Zee JS, Schadé E. Risk of depression in patients with chronic obstructive pulmonary disease and its determinants. Thorax. 2002;57(5):412-6.
28. Sant'Anna CA, Stelmach R, Zanetti Feltrin MI, Filho WJ, Chiba T, Cukier A. Evaluation of health-related quality of life in low-income patients with COPD receiving long-term oxygen therapy. Chest. 2003;123(1):136-41.
29. Goldney RD, Ruffin R, Fisher L, Wilson DH. Asthma symptoms associated with depression and lower quality of life: a population survey. Med J Aust. 2003;178(9):437-41. Erratum in: Med J Aust. 2003;179(1):17.
30. Perna G, Caldirola D, Bellodi L. Panic disorder: from respiration to the homeostatic brain. Acta Neuropsychiatrica. 2004;16(1):57-67.