

Anxiety and the management of asthma in an adult outpatient population

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Abstract:

Background: Review of the literature suggests that anxiety is more common among patients with asthma than among the general population, yet it does not appear to be given the attention it deserves as part of the overall management of asthma. The aim of this study was to investigate the relationship between anxiety and asthma management, in terms of Global Initiative for Asthma steps, lung function and medication.

Methods: A total of 201 consecutive patients with respiratory physician-diagnosed asthma were recruited from an adult outpatient asthma clinic. Participants underwent a sociodemographic review, and a medical interview which included a detailed drug history. Forced expiratory volume in 1 second (FEV₁) and peak expiratory flow (PEF) values were recorded using a Micro Medical® portable spirometer. The level of anxiety was assessed using the Beck Anxiety Inventory (BAI).

Results: A total of 51.5% of participants registered clinically significant levels of anxiety. Of these only 21% had already been diagnosed and were receiving treatment. Females reported significantly higher BAI scores than males ($p < 0.01$). More females (66.3%) registered clinically significant levels of anxiety as compared with males (33.7%) ($p < 0.05$). There was a positive correlation between the BAI score and the prescribed dose of inhaled glucocorticoids ($r_s = 0.150$, $p < 0.05$) and between anxiety and GINA treatment step ($r_s = 0.139$, $p < 0.05$). There was also a positive correlation between anxiety and the number of medicines taken by patients ($r_s = 0.259$, $p < 0.001$).

Conclusions: Physicians treating patients with asthma should be sensitised to the association between asthma and anxiety, and should also consider assessing patients for the possibility of anxiety disorders as part of asthma management plans.

Keywords: asthma, anxiety, lung function, medication

Introduction

The focus of treatment decisions in asthma should be based on control of the condition [GINA, 2008]. The current trend in asthma management is therefore aimed at addressing the ‘unmet needs in asthma’ which arise from factors related to poor disease control [Rabe *et al.* 2004]. The overall aim is to achieve better control of asthma with patients leading as normal a life as possible. Asthma management guidelines give a clear definition of control: this is not limited to optimising lung function but incorporates symptom control, a fulfilling lifestyle, proper use of rescue/reliever medication, and reduction in the number and severity of exacerbations. Increasing emphasis is being placed on the patient being a full partner in the management decisions to

achieve control [GINA, 2008; NAEPP, 2007]. This can only be achieved through a strong doctor–patient relationship, and one which allows for enough time to make a holistic assessment of patients’ needs, addressing any underlying problems and concerns. Any psychiatric symptoms, psychological disturbance and perception of asthma should also be assessed, as these factors could contribute significantly to diminished control of asthma [Bosley *et al.* 1996].

The relationship between asthma and anxiety has long been established [Smoller and Otto, 1998; Yellowlees and Kalucy, 1990] and various studies have established that anxiety is more common in persons with asthma than in the general population. Persons with asthma have been found to be

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twice as likely to report frequent mental distress (FMD) as compared with those without asthma. Asthmatics with FMD were more likely to report frequent anxiety symptoms [Strine *et al.* 2004]. Goodwin *et al.* [2004] reported elevated rates of depressive and anxiety disorders among young adults with asthma as compared with their counterparts without asthma in the community. A population-based study of adolescents with asthma found that those with an anxiety or depressive disorder reported significantly more asthma symptoms than those not presenting with these disorders [Richardson *et al.* 2006]. Studies have also found elevated rates of asthma amongst patients with anxiety disorders. Higher rates of asthma were found among adolescent psychiatric inpatients with post-traumatic stress disorder (PTSD) [Koltek *et al.* 1998] and similar findings were reported in primary care patients [Weisberg *et al.* 2002]. The association between asthma and anxiety appears to exist independently of the degree of severity of asthma [Valenca *et al.* 2006; Brinke *et al.* 2001].

The possibility of anxiety as a risk factor for developing asthma was examined by Jonas *et al.* [1999] and it was found that the relative risks of developing asthma were increased significantly in nonsmokers with high and intermediate levels of anxiety symptoms. The presence of anxiety in patients with asthma has been associated with suboptimal asthma-related quality of life and is possibly linked to decreased adherence to therapy [Lavoie *et al.* 2006; Cluley and Cochrane, 2001].

While the link between asthma and anxiety is evident, the causal direction between anxiety and poor disease management and control remains unclear. It may either be a consequence of, or a contributor to the condition. A Swiss community-based, prospective longitudinal study investigated whether active asthma predicted subsequent panic disorder and whether tendency to panic predicted active asthma. The results indicate both that active asthma predicted subsequent panic disorder and vice-versa. This effect was more pronounced among women and persons under the age of 30 years. However, the major limitation of this study was that the diagnosis of asthma was self-reported [Hasler *et al.* 2005]. The aim of this study is to investigate the relationships between patient anxiety and asthma management, in terms of GINA step, lung function and medication.

Methods

Study subjects

A consecutive series of outpatients with respiratory physician-confirmed asthma was recruited from the adult asthma clinic at St Luke's Hospital, Malta over a 3-month period. Patients were eligible for inclusion if they had a primary diagnosis of asthma and were receiving inhaled glucocorticoid therapy for a duration of 12 months or more. A total of 215 patients presented at the asthma clinic, all of whom were screened for inclusion in the study. A total of 14 patients did not satisfy the criteria for inclusion in the study (10 patients had been on inhaled glucocorticoid therapy for less than a year, one patient was not on inhaled glucocorticoids and three patients refused to participate). Informed consent was obtained from all patients and ethical approval for the study was obtained from the Research Ethics Committee of the University of Malta.

Study design

Eligible participants underwent a medical interview to document sociodemographic characteristics, medical history and a detailed drug history covering their asthma medication as well as any other medication they were concurrently taking. All information was verified by cross-referencing to the patients' medical files. Information regarding prescribed asthma medication was used to classify patients according to one of the five asthma treatment steps as defined by GINA. Patients also underwent spirometry testing in line with European Respiratory Society guidelines [European Respiratory Society, 1993]. Forced expiratory volume in one second (FEV₁) and peak expiratory flow (PEF) were recorded using a Micro Medical® portable spirometer.

Assessment tool

The level of anxiety was assessed using the Beck Anxiety Inventory (BAI). The BAI consists of 21 descriptive statements of anxiety symptoms which are rated on a four-point scale ranging from 0 to 3. The maximum score is 63 points. Total scores from 0 to 7 are considered to reflect a minimal level of anxiety, scores of 8–15 indicate mild anxiety, scores of 16–25 reflect moderate anxiety and scores of 26–63 indicate severe anxiety. A clinically significant level of anxiety was defined by a score of ≥ 16 on the BAI [Beck and Steer, 1993].

Data analysis

The data were analysed using SPSS version 15. Spearman rank order correlation coefficient was used to determine relationships between anxiety and age, prescribed dose of inhaled glucocorticoid, GINA step, FEV₁, PEF and the number of different types of medicines patients were taking. Spearman rank order correlation coefficient was used to determine the relationship between lung function parameters of FEV₁ and PEF with prescribed dose of inhaled glucocorticoid and GINA step. The Mann–Whitney test was used to determine relationships between FEV₁, gender and anxiety. The Kruskal–Wallis test was used to determine relationships between anxiety and comorbidities. For the purpose of analysing GINA step and anxiety, steps 4 and 5 were combined. A *p*-value of <0.05 was considered significant.

Results

The characteristics of the study sample are summarised in Table 1. A total of 58% had percentage predicted FEV₁ of ≥80%, 23% had a percentage predicted FEV₁ between 60% and 79%, and 19% had a percentage predicted FEV₁ of <60%. Females, had a higher mean percentage predicted FEV₁ (females: 85 ± 2.63, males: 77.8 ± 2.4, *p* < 0.05). The majority of patients were being treated at GINA steps 4 and 5 with 57.7% receiving a high (>1000 µg beclomethasone or equivalent) daily dose of inhaled glucocorticoids. A total of 45.7% of patients studied, had chronic comorbid conditions. There were predominantly cardiovascular problems (29.4%), anxiety/depression (13.4%), other respiratory disorders (mainly rhinitis), (10%) and diabetes mellitus (7%).

The mean BAI score was 17.7 ± 0.8 (SEM), with 51.5% registering clinically significant levels of anxiety (BAI ≥ 16) as presented in Table 2. Of these only 21% had their anxiety formally diagnosed and were receiving treatment for such. Females reported significantly higher BAI scores than males (19.6 ± 1.06 *versus* 15.1 ± 1.2, *p* < 0.01). More females registered clinically significant levels of anxiety as compared with males (66.3% *versus* 33.7%, *p* < 0.05). There was a positive correlation between the BAI score and the prescribed dose of inhaled glucocorticoids (*r*_s = 0.150, *p* < 0.05). A positive correlation was also established between anxiety and GINA treatment step (*r*_s = 0.139, *p* < 0.05). Further analysis revealed a positive correlation between anxiety

Table 1. Characteristics of patients.

Characteristic	
Total	201
Females	118 (58.7%)
Age mean (years)	48.9 ± 1.25
Age range (years)	17–83
FEV ₁ (mean % predicted)	82.01 ± 1.67
PEF (mean % predicted)	77.53 ± 1.79
Patient treatment (GINA guidelines)	
Step 2	57 (28.4%)
Step 3	26 (12.9%)
Step 4	108 (53.7%)
Step 5	10 (5%)
Prescribed medicines mean	3.5 ± 0.13
Range	1–9
Patients receiving treatment for anxiety	27 (13.4%)
Mean values are given ± SEM	

Table 2. Severity of anxiety using the Beck Anxiety Inventory (BAI).

Anxiety level (BAI Score)	Male		Female		Total	
	No	%	No	%	No	%
Minimal (0–7)	19	23.0	20	16.9	39	19.4
Mild (8–15)	29	34.9	29	24.6	58	28.9
Moderate (16–25)	21	25.3	33	28.0	54	26.6
Severe (26–63)	14	16.8	36	30.5	50	24.9

and the number of medicines taken by patients (*r*_s = 0.259, *p* < 0.001). When analysed independently both genders showed a positive correlation between the number of medicines being taken and anxiety (males: *r*_s = 0.267, *p* < 0.05, females: *r*_s = 0.260, *p* < 0.01).

Negative correlations were established between percentage predicted FEV₁ and dose of prescribed inhaled glucocorticoid (*r*_s = −0.352, *p* < 0.01), PEF and dose of prescribed inhaled glucocorticoid (*r*_s = −0.267, *p* < 0.01), percentage predicted FEV₁ and GINA step (*r*_s = −0.397, *p* < 0.01), and PEF and GINA step (*r*_s = −0.296, *p* < 0.01). There was no association between the objective asthma-related variables of percentage predicted FEV₁ and PEF and anxiety. Age, or the number of diagnosed comorbid conditions, were not significantly associated with anxiety.

Discussion

The results of the present study are consistent with and extend previous findings related to the association between asthma and anxiety.

Our data confirm a high prevalence of anxiety among patients with asthma (51.5%). These findings fall in the upper end of the prevalence spectrum of anxiety in asthma as reported in the literature [Katon *et al.* 2004] and are in line with a similar study which reported a 52.3% prevalence of anxiety carried out in an outpatient asthma unit setting in Brazil [Nascimento *et al.* 2002]. The high level of anxiety documented in the present study did not have any impact on lung function, as there was no correlation between the objective measures of FEV₁ or PEF with anxiety; this finding is also supported by other studies [Krommydas *et al.* 2004; Rimington *et al.* 2001]. It has been suggested that the association between asthma and anxiety may be due to the central role of respiratory factors in anxiety disorders. Anxiety itself may lead to hyperventilation, irrespective of the degree of objective pulmonary impairment, and in the presence of some form of airways obstruction, it may result in increased breathlessness [Carr, 1998]. As in the general population, the majority of the patients with clinically significant anxiety (79%) were undiagnosed and untreated, a finding also supported by other studies [Valenca *et al.* 2006; Goodwin, 2003]. Various barriers have been cited with regards to the diagnosis and treatment of anxiety, such as the stigma perceived by patients, who would tend to exaggerate their somatic complaints, to health care professionals lacking interest and time to make the appropriate diagnosis [Kunik *et al.* 2005]. An additional possibility is the limited availability of integrated mental health services at community level [Rutz, 2002]. Furthermore, studies related to physician–patient interaction in asthma management have shown that patients' concerns may not be sufficiently addressed due to lack of time and poor communication [Canonica *et al.* 2007; Moffat *et al.* 2006].

Women reported significantly higher levels of anxiety than males (19.6 *versus* 15.1) despite registering significantly higher mean levels of percentage predicted FEV₁ (85% *versus* 77.8%). It is well established that women are more likely to develop anxiety disorders than men [Pigott, 1999] and the BAI manual [1993] also indicates that the BAI score for women may be an average of four points higher than for men. This trend has also been reflected in other studies related to anxiety and respiratory disease [Moussas *et al.* 2008]. In a study of postmenopausal women aged 50 years and over, Smoller *et al.* [2003] reported that

women with a history of asthma were more likely to report full-blown panic attacks. This relates well with the findings in the present study whereby 66.7% of women who reported clinically significant anxiety were aged 50 years and over. The increased levels of anxiety in women notwithstanding better percentage predicted FEV₁ is supported by Carr *et al.*'s [1996] work, which also found a positive association with lung function. There are, however, other studies which have found no gender differences in the levels of anxiety between males and females [Deshmukh *et al.* 2008].

Higher levels of anxiety were positively associated with high doses of inhaled glucocorticoids and consequently management at higher GINA steps. Considering that the majority of the study sample (58%) had a predicted FEV₁ of over 80% and 57.7% of population were receiving high doses of inhaled glucocorticoids, it is pertinent to question the basis for the sustained prescription of high doses of inhaled glucocorticoids, especially since at each patient visit to asthma clinic, lung function tests are performed. Our data did, however, produce a negative correlation between lung function (FEV₁, PEF) and prescribed dose of inhaled glucocorticoids as well as GINA step, indicating the lower the lung function the higher the treatment step. This result also provides validity to our population reflecting the study by Rimington *et al.* [2001]. Other studies failed to document a relationship between FEV₁, PEF, FVC and physicians' prescribing decisions [Hyland *et al.* 1993].

It is possible that prescribing decisions are mostly based on patients' reported symptoms without giving sufficient weight to lung function values. It is also possible, that physicians could treat a psychological problem as a medical problem and overprescribe inhaled glucocorticoids instead of identifying and treating the underlying anxiety [Dirks *et al.* 1979]. An additional factor worth considering is that medications used to control asthma (i.e. inhaled glucocorticoids, adrenoreceptor agonists and theophylline) have all been implicated in provoking anxiety. In our sample, all patients had been on inhaled glucocorticoids for over a year, 5% were on long-term low-dose oral steroids, 11.4% had taken a rescue course within the preceding 3 months, 10.4% were taking steroids intranasally, 10% were additionally taking long-acting beta adrenergic agonists and 9.4% were taking theophylline. All the

patients in our study were taking inhaled salbutamol on an 'as required' basis. All these medications could have contributed to the high anxiety levels recorded.

Our data revealed a relationship between the number of different medications taken by the patient and anxiety levels. The higher the number of medications, the higher the anxiety level recorded; this fact could also in itself be an additional contributing factor to the high anxiety levels. Patients suffering from respiratory and cardiovascular disease are particularly prone to polypharmacy [Bjerrum *et al.* 1998] which in turn is likely to lead to inappropriate use of medicines. The frequency of inappropriate medication use rises with the number of medicines being taken [Steinmen *et al.* 2006] and it follows that in encounters with patients, appropriate multifaceted, multidisciplinary interventions should be aimed at optimising use of medications.

There are a number of limitations to the present study. The group of patients studied attended a respiratory specialist-run outpatient asthma clinic. Patients attending this clinic are perceived to fall in the moderate-to-severe spectrum of severity and do not mirror the general population. The level of anxiety was self-reported and was not validated by a professional structured diagnostic assessment. The study did not record data relating to patients' symptoms, which could have given a more comprehensive picture of the study population. The present study was an observational, uncontrolled, cross-sectional study and therefore cannot determine if the observed associations are causal or not.

Physicians treating patients with asthma should be sensitised to the association between asthma and anxiety and should also consider assessing the patient for possibility of anxiety disorders. A systematic evaluation for possible comorbid anxiety disorders should be a part of asthma management [Boulet, 2009]. While the diagnosis of anxiety disorders in patients with asthma may be challenging, it may at times be more appropriate to treat the anxiety state rather than step up the medication. This approach could have a steroid-sparing effect, achieving control at the lowest possible dose. Judicious use of anxiolytic medication is necessary due to negative effect of certain medications within this class (e.g. benzodiazepines) on breathing. The use of alternative

approaches to the management of anxiety in patients such as cognitive behaviour therapy [Deshmukh *et al.* 2007] may also help to achieve a positive outcome while avoiding the additional use of medicines.

Conflict of interest statement

None declared.

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