Topical Review

Reviewing asthma and anxiety

C. TEN ThOREN AND F. PETERMANN

Centre for Rehabilitation Research, University of Bremen, Germany

The main characteristic of asthma is sudden and unexpected attacks of impaired breathing. Both the attacks themselves and the prospect of attacks generate much anxiety amongst patients. Several different forms of anxiety can be identified which vary in intensity and the situations in which they appear. Anxiety disorders are more common in asthmatics and have a considerable influence on asthma management because they influence symptom perception. Excessive anxiety about asthma symptoms can affect the patient’s response to an asthma attack; anxiety related to asthma triggers can reduce the patient’s quality of life and anxiety related to medical treatment can influence compliance. The extent of this influence depends upon an individual’s ability to cope. Behavioural therapeutic programmes for patient education offer an opportunity to reduce anxiety and to improve asthma self-management. Physicians should look carefully for anxiety when taking the patient’s history, and should support the patient’s participation in asthma education programs.

Key words: asthma; anxiety; perception; asthma management.

© 2000 HARcourt PUBLISHERS LTD

Introduction

The main characteristics of asthma are sudden and unexpected attacks of impaired breathing, so asthma attacks are a constant threat for asthmatics. This real or anticipated threat is accompanied by a general feeling of tension and activation, which is known as anxiety. The physiology correlates of anxiety are increased muscle tension, sweating, accelerated breathing and a subjective feeling of chest tightness. Cognitive correlates of anxiety are a difficulty in concentration, thought storms and disordered thinking (Table 1).

Different forms of anxiety

When reviewing the inter-dependence between anxiety and asthma, it is important to differentiate between the different forms of anxiety.

Firstly, anxiety can be arranged according to intensity. Very strong anxieties can be classified as different ‘clinical anxiety disorders’ when using the common manuals for the diagnosis (DSM-IV, ICD-10). When an anxiety is not strong enough to fit the criteria for an anxiety disorder, it is labelled as a ‘sub-clinical anxiety’ in the subsequent text. The difference between clinical and sub-clinical anxieties is somewhat arbitrary, because sub-clinical anxieties can also influence the experience and behaviour of an individual. Most of the studies of anxiety in asthma deal with sub-clinical anxieties, but some studies have discovered an increased prevalence of anxiety disorders in asthmatic populations (1).

Secondly, one can classify anxieties according to their situation specificity. Spielberger (2) noticed that it is appropriate to regard this as a continuum with one pole describing the fear of specific stimuli or situations, for example an asthma attack (‘state’ anxiety), whilst the other pole describes a general feeling of anxiety (a trait) which influences the perception and processing of different situations, and thereby influences the perception of asthma as a chronic disease as well (‘trait’ anxiety; Fig. 1).

In asthma, many situations are predisposed to be accompanied by anxiety. Anxiety is often prominent before and during an acute attack because recurrent and possibly lethal asthma attacks are major characteristics of the disorder. When difficulty in breathing is considered to be extremely threatening and unavoidable, the patient can develop an anxious perception of real and potential asthma triggers. On the one hand, fear of asthma symptoms and asthma stimuli is reasonable, because this may motivate asthmatics to practice responsible asthma management; on the other hand, when anxieties are overwhelming or unfounded, adequate illness behaviour will be compromised. For example, an unfounded fear of side-effects might seriously interfere with medication compliance and can therefore lead to an aggravation of asthma symptoms (Table 2).

The following sections will address the inter-dependence between asthma and the two different forms of anxiety, as well as the three forms of asthma-specific anxiety as noted above. There will be no differentiation between studies conducted with children and adults, because at this time there is not empirical evidence to indicate any substantial difference in the experience of anxiety at different ages.
Asthma and anxiety disorders

Many studies have detected an increased prevalence of anxiety disorders in asthma patients (Table 3). For example, Shavitt et al. (3) showed that agoraphobia and panic disorder are more common in asthmatics than in the total population (13.1 and 6.5% vs. 2.8 and 2.3%, respectively). On the one hand, the inter-dependence between asthma and panic disorders is important, because panic attacks are often associated with hyperventilation which causes increased inhalation of cold air which, in turn, has a strong bronchoconstrictive effect (4). On the other hand, one of the main characteristics of panic disorders is an increased sensibility of bodily sensations which, in conjunction with a threatening interpretation of asthma symptoms, can trigger panic attacks. Kinsman et al. (5) noticed that it is extremely difficult to adjust asthma patients medically if they are suffering from a panic disorder.

Bussing et al. (6) reported a prevalence rate of anxiety twice as high in asthmatic children as in healthy ones, and the most frequent anxiety disorder was separation anxiety. Although the asthmatic children also reported more symptoms of panic disorder, no increased prevalence could be detected in this study.

In principle, one could expect a relationship between the intensity of asthma symptoms and the intensity of experienced anxiety. The study by Vila et al. (7) supports this hypothesis by reporting a tendency for an increased prevalence of anxiety disorders in asthmatic children suffering from more severe asthma. In contrast, the studies by Wamboldt et al. (8) and Bussing et al. (6) detected no relationship between the occurrence of an anxiety disorder and asthma severity.

In summary, little attention has been paid to the comorbidity between asthma and anxiety disorders. Especially striking is the lack of well-evaluated methods for intervention that take into consideration the panic disorder as well as the impairment through asthma symptoms.

General anxiety and perception

In principle it is important to distinguish the perception of bodily sensations from the perception of external factors. Asthma patients need an adequate perception of bodily sensations, as well as of external factors such as symptom triggers, if they are to react appropriately and prevent symptom aggravations.

Most of the studies which have focused on the interdependence between asthma and anxiety have concentrated on the influence of general anxiety and anxiety disorders, and the results are inconsistent. Some studies have reported an increased accuracy of perception at higher levels of general anxiety, whilst other studies have observed the opposite. Table 4 contains an overview of the principal investigations in this field and their results.

Tiller (9) studied asthmatics with and without anxiety disorders and found that asthmatics without anxiety disorder were able to notice smaller changes in airway resistance. Anxious asthmatics first noticed a change at a higher increment of airway resistance, suggesting that they are at a higher risk of sudden asthma attacks because they do not perceive the early warning signals.

In a more recent study, Rushford et al. (10) discovered that those asthmatics who tended to over or underestimate their airway resistance showed a higher prevalence of

<table>
<thead>
<tr>
<th>TABLE 1. Characteristics of anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotional</strong></td>
</tr>
<tr>
<td>General feeling of tension</td>
</tr>
<tr>
<td><strong>Physiological</strong></td>
</tr>
<tr>
<td>Sweating</td>
</tr>
<tr>
<td>Higher muscle tension</td>
</tr>
<tr>
<td>Accelerated breathing</td>
</tr>
<tr>
<td>Subjective feeling of chest-tightness</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
</tr>
<tr>
<td>Difficulties in concentration</td>
</tr>
<tr>
<td>Thought-storms</td>
</tr>
<tr>
<td>Thought-stop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2. Different forms of asthma specific anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety related to symptoms</td>
</tr>
<tr>
<td>Anxiety related to asthma triggers</td>
</tr>
<tr>
<td>Anxiety related to medical treatment</td>
</tr>
</tbody>
</table>
anxiety disorders (under-estimators: 30%; over-estimators: 54%; adequate estimators: 8%, respectively).

Steptoe and Voègele (11) found a positive correlation between general anxiety and a subjective increase in shortness of breath. The perceived obstruction was not accompanied by an objective increase of airway obstruction, resulting in an overestimation of disability.

Belloch et al. (12) reported a negative correlation between general anxiety and accuracy of perception in atopic asthmatics, but not in non-atopics.

In contrast, Spinhoven et al. (14) detected a higher accuracy of perception in anxious patients when their airway obstruction was artificially increased during bronchial challenge testing.

The results of the investigation by Maes and Schlösser (15) showed, in addition, that trait anxiety has negative effects on the subjective well-being of asthmatics. Surprisingly, higher levels of trait anxiety were not accompanied by a higher rate of re-hospitalization. This result indicates that while higher trait-anxious asthmatics do indeed feel worse than asthmatics with less trait anxiety, this negative affectivity does not lead them to seek additional medical aid.

One of the few studies that focused on asthma specific anxiety and its impact on perception accuracy was designed by Dahme and colleagues (16). The authors found that the more perception accuracy deteriorated, the more asthmatics became anxious about their symptoms. Moreover, highly anxious people with a low accuracy in perception called the first aid doctor more frequently than patients whose perception abilities were adequate.

Taken together, these studies show how dramatically general anxiety as well as asthma specific anxiety can influence the ability of asthmatics to detect changes in airway obstruction. Either an over- or an underestimation compromises adequate behaviour in symptom aggravations.

**Anxiety related to asthma symptoms**

Anxiety is a natural reaction in life-threatening situations, because the body is being alarmed and all management resources will be mobilized. According to Lazarus and Folkman’s model (17), by confronting the patient with a

<table>
<thead>
<tr>
<th>Study</th>
<th>Concept of anxiety</th>
<th>Implications for perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maes and Schlösser (14)</td>
<td>General anxiety, anxiety disorder</td>
<td>No higher rate of re-hospitalization</td>
</tr>
<tr>
<td>Tiller (9)</td>
<td>General anxiety, general anxiety</td>
<td>Decreased symptom perception</td>
</tr>
<tr>
<td>Steptoe and Vögele (11)</td>
<td>General anxiety</td>
<td>Increased symptom perception</td>
</tr>
<tr>
<td>Belloch et al. (12)</td>
<td>General anxiety</td>
<td>Increased and decreased symptom perception in atopic asthmatics</td>
</tr>
<tr>
<td>Priel et al. (13)</td>
<td>General anxiety</td>
<td>Increased symptom perception, no increased demand for medical support</td>
</tr>
<tr>
<td>Spinhoven et al. (14)</td>
<td>General anxiety</td>
<td>Increased accuracy of perception</td>
</tr>
<tr>
<td>Rushford et al. (10)</td>
<td>Anxiety disorder</td>
<td>Decreased as well as increased symptom perception</td>
</tr>
</tbody>
</table>
potentially threatening stimulus, the situations will firstly be analysed regarding the intensity of the threat, secondly the patient’s own management abilities are checked, and finally the situation will be re-appraised. When the situation seems to be extremely threatening, and/or the patient’s own management abilities are considered to be insufficient, an increase in the patient’s anxiety can be expected.

Butz and Alexander (18) reported that two-thirds of asthmatics are anxious during an acute asthma attack. Invoking Lazarus and Folkman’s model (17), the intensity of anxiety depends firstly on the estimated seriousness of the attack and secondly on the strategies available to reduce airway obstruction. This estimation of severity is again influenced by experience of the process and the evolution of prior attacks, as well as the patient’s theoretical knowledge or misconceptions about asthma. If the last attack required an admission to hospital, subsequent attacks will probably be estimated to be more threatening than if the patient’s most recent experience indicates that asthma attacks will cease without treatment after a while. The knowledge that asthma attacks are potentially life threatening can also intensify anxiety.

In addition to the real behavioural abilities to manage asthma attacks, anticipated self-efficacy plays a significant part. Bandura (19) defines self-efficacy as ‘the conviction that one can successfully execute the behaviour required to produce the outcomes. Outcome and efficacy expectations are differentiated, because individuals can believe that a particular course of action will produce a certain outcome, but if they entertain serious doubts about whether they can perform the necessary activities such information does not influence their behaviour’. A child may know, in theory, that taking an as needed medication may be helpful during attacks, but if the child does not believe in its own ability to apply to medication correctly, it will feel helpless. In both self-efficacy and appraisal of their own management abilities, experiences in similar situations are important. Schlo¨sser and Havermans (20) discovered that children with a higher degree of self-efficacy were better able to cope with asthma attacks; for example, these children showed more reasonable behaviour and made less attempts to hide their asthma. Self-efficacy seems to be related to age: older children reported more self-efficacy, because they had more experience with the management of their asthma. Moreover, the authors found that higher self-efficacy is correlated with less asthma specific anxiety and leads to better management of asthma attacks.

These results are supported by the study of Miles et al. (21) who found higher levels of self-efficacy in older children, probably originating from prior experiences.

Anxiety and asthma triggers

When asthma attacks cannot be foreseen and are experienced as uncontrollable and extremely frightening, one way of gaining control is to establish which factors are triggering asthma and then try to avoid them in the future. With real asthma triggers, this behaviour is an adequate method of managing the disease. It is apparent that anxiety is necessary to some extent in order to motivate patients to avoid asthma triggers. However, when the stimulus which is imagined to be an asthma trigger has no broncho-constrictive effect but is nevertheless avoided, there will be no further evidence of its asthma-triggering effects and an unnecessary reduction in the patient’s quality of life follows. Moreover, the avoidance of sport, which is a common asthma trigger, often leads to an increased intensification of exercise-induced asthma.

Anxiety related to treatment

AS-NEEDED MEDICATION

When, as noted above, anxiety influences the perception of symptoms and the intensity of airway obstruction, it is likely that the taking of as-needed medication will also be influenced because the asthmatic is not able to adjust the dosage to the intensity of symptoms.

In a classic study, Dahlem et al. (22) described how the amount of as-needed medication taken did not necessarily correlate with the real intensity of airway obstruction and they identified three group in connection with asthma-specific anxiety. The first group is characterized by moderate asthma-specific anxiety and showed a good correlation between taking as-needed medication and real airway obstruction. The second group showed high levels of asthma-specific anxiety and were taking large doses of as-needed medication. The third group showed low levels of asthma-specific anxiety and took low doses of their as-needed medication which was not related to the real intensity of airway obstruction.

In contrast to the study of Dahlem (22), Bosley et al. (23), found no correlation between the intensity of asthma-specific anxiety and compliance with as-needed medication using a computer to assess the frequency of intake.

Moreover, Dirks et al. (24) reported that the intensity of asthma-specific anxiety not only had an effect on medication intake, but that doctors also prescribed higher doses of medication for patients who were more anxious. Later on the investigators studied the rate of re-hospitalization related to asthma-specific and/or general anxiety. Their results showed that the patients with most re-admissions to hospital had either high or low levels of general anxiety independent of their asthma-specific anxiety. The best prognosis was found in patients who showed a moderate level of general anxiety and a high level of asthma-specific anxiety.

The importance of general anxiety is underlined by the study of Mawhinney et al. (25), where the results showed that asthmatics with high levels of general anxiety showed an arbitrary use of their as needed medication.

Overall, it is apparent that asthma-specific anxiety is important in emergency compliance, because patients are warned in time and so have the chance to change their behaviour and take their as-needed medication. Early intervention minimizes the risk for symptom aggravation, while asthma attacks and the risk of re-admission can be avoided. The importance of asthma-specific anxiety is
finally underlined by Kinsman (5): ‘... anxiety focused directly upon breathing difficulties in asthma is a good thing, and its absence in not’. When a patient is having breathing difficulties, high levels of general anxiety do not necessarily lead to an intake of as-needed medication in time, or initiate a search for medical assistance. This increases the risk of an aggravation and re-admission to hospital becomes more likely.

Programmes for patient education offer a chance of reducing asthma-specific anxieties. The result discussed above leads to the conclusion that patient education should not be aiming to reduce anxieties to the minimum possible. This assumption is supported by the ‘common-sense’ model of Leventhal (26), in which the highest level of compliance and the greatest search for medical support should be expected when patients experience a high level of anxiety, strong symptomatology and an interpretation as a threat.

Long-term medication

In addition to the effects or use of as-needed medication, the intake of long-term medication is also influenced by anxiety. Fear of possible side-effects plays an important role, especially in therapy with inhaled steroids (Leickly et al. (27)). Because this fear bears no relation to the real likelihood of side-effects, the term ‘cortico-phobia’ was created to describe the phenomenon. If patients do not take their inhaled corticoid regularly, they lose the opportunity of receiving a potent therapy with relatively few side-effects.

At the same time, this aversion to corticoids does not seem to be restricted to patients. Whiteman and Gaduzo (28) discovered that prescription of inhaled steroids in accordance with the guidelines of asthma management is rare and this can be interpreted as meaning that doctors show an anxious aversion.

The implication of cortico-phobia is underlined by Chang et al. (29), who saw the main causes for increasing mortality rates in asthma as (a) the inadequate provision of inhaled steroids due to insufficient prescription and compliance, and (b) a consequent overdose of ($\beta_2$-mimetics).

Finally, it should be mentioned that the medication itself can have an anxiety-inducing effect. The intake of theophylline is accompanied by a non-specific activation; Stoloff (30) noted that, at high dosages, theophylline caused sleeplessness, headaches and gastrointestinal discomfort, and that anxiety could occur as a side-effect.

Anxiety and coping

The extent to which anxiety can influence perception, and thereby medication compliance, depends upon each individual’s ability to cope.

An interesting point of attachment was chosen by Nouwen et al. (31), who subjected healthy volunteers and asthmatics to a bronchial challenge test. The authors discovered that the healthy volunteers, after an inexact estimation in the first turn, showed an increased accuracy in the second. In contrast, the asthmatics showed a decrease in perception accuracy. This was interpreted as indicating that situation-dependent cognitive schemes influence perception and the reporting of symptoms.

Rietveld (32) discussed the influence of six probable perceptual strategies on symptom perception.

(a) Selective perception of asthma-related information enhanced the likelihood that symptoms of asthma are perceived.

(b) Asthma-congruent interpretation of information in ambiguous situations can accompany overperception of symptoms.

The next four strategies were associated with blunted perception:

(c) an unconscious repression of symptoms;

(d) a conscious neglect of symptoms;

(e) a false interpretation of symptoms; and

(f) a habituation to chronic or prolonged duration of symptoms.

Steiner (33) noted that there is a close relationship between the coping style ‘repression sensitization’ and the accuracy of perception. They found that patients who tend to suppress their feelings of anxiety (‘repressing’) showed an impaired perception accuracy, especially an underestimation, leading to the conclusion that patients who tend to suppress their anxiety believe that their asthma symptoms are less severe than they really are. As a result, they do not make an effort to adjust their behaviour and are therefore at higher risk of symptom aggravation and re-admission to hospital.

Taken together, it is obvious that the term ‘coping’ is too expansive and encloses too many strategies to derive definitive statements about the relationship between cognitive strategies and asthma management. It is important to note that when information about cognitive strategies and possibilities for change becomes available, there will be new opportunities to help asthmatics develop more effective asthma management.

A differentiated view

Finally, Miller and Wood (34) argued that it is important to take a differentiated view when talking about the relationship between asthma and emotions. They stated that one has to differentiate between asthmatics who show an impairment in relation to anxiety or depression and asthmatics who do not show any emotionally triggered pulmonary reaction. Furthermore, the authors detected the greatest bronchial hyperreactivity during bronchial challenge testing in asthmatic children who are more emotionally unstable as regards their asthma. In his studies, Oppermann (35) noted that emotional triggers for a heavy asthma attack could only be found in two-thirds of asthmatics. This view offers a plausible explanation for the heterogeneous results in studies dealing with asthma.
and anxiety and offers a new and interesting perspective for further research.

Conclusions

It is important to differentiate between the several forms of anxiety in order to achieve a better understanding of the complex inter-dependence between anxiety and asthma symptomatology. This differentiation between the three different asthma-specific types of situations in which anxiety plays a salient role (anxiety related to symptomatology, treatment and triggers), is helpful to develop and apply specific methods of intervention. With the exception of phobias which are an extremely situation-specific anxiety, for every form of anxiety there are studies which underline the importance of anxiety in asthma. Phobias are an extremely anxious reaction to stimuli or situations relevant in asthma (e.g. symptoms, triggers or medications) and these deserve more scientific consideration because one can assume that phobic avoidance of special situations will lead to a significant impairment of the patient’s quality of life. Problems with compliance can be expected in phobias related to medication treatment, while a significant impairment of quality of life can occur in phobias related to special asthma triggers.

Behavioural therapeutic programmes for patient education offer different points of attachment to reduce anxieties in asthmatic patient. Teaching of asthma relevant knowledge, for example, about the causes and prognosis of the disease, can either reduce anxiety (‘My asthma will be gone with puberty’), or can provoke anxiety (‘I could die!’). Knowledge about relevant asthma triggers, as well as measures of avoidance, should increase feelings of control and thereby reduce anxiety. Learning about the correct application, and either the effects or side-effects of medication, increases the feeling of self-efficacy and decreases their asthma-specific anxiety. Furthermore, unfounded anxiety in respect of inhaled corticoids will be reduced and compliance should improve.

The second aim in patient education programmes is training to improve symptom perception. Patients get the opportunity to experience the importance of careful self-observation and to improve it. Furthermore, increased skill in symptom perception enables patients to recognize the warning sings of an impending asthma attack and anxiety will therefore be reduced because patients will not longer be surprised by asthma attacks that come out of the blue. Training in the perception of asthma triggers is also very important and supports the process of anxiety reduction.

Moreover, through education programmes patients have the chance to learn different techniques for dealing with a current asthma attack. These abilities have a positive effect on self-efficacy and thereby reduce anxiety. Relaxation techniques complete the training and offer an opportunity to reduce the levels of stress and general anxiety. Finally, sport therapy is an effective method to combat anxious avoidance of sports by developing effective strategies to recognize symptoms in good time. With reduced anxiety related to physiological activities, the patients will be able to expand their lifestyle options and improve their quality of life.

It is important to emphasize that it is not the aim of patient education programmes to reduce asthma-specific and general anxiety to a minimum, because asthma-specific anxiety is necessary to help patients stay alert to the threat of an asthma attack and, when one occurs, to initiate adequate therapeutic steps. However, when an asthmatic is overwhelmed by anxiety, a reduction in the level of that anxiety can help support the management of their asthma, which is why it is so important to look carefully for anxieties and their intensities in history and evaluation of the patient. After reaching a firm diagnosis, patients should be offered the opportunity to take part in a programme of patient education, or in a programme of patient education in combination with psychotherapy (behavioural therapy by preference), if they exhibit anxiety disorders.

References


