

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Psychological Factors in Asthma and Psychoeducational Interventions

Lia Fernandes

*Department of Psychiatry and Mental Health,
Faculty of Medicine, University of Oporto,
Psychiatry Service of S. João Hospital, Oporto,
Portugal*

1. Introduction

This subject is of interest as asthma has increased over the last two decades. Despite therapeutic advances, morbidity and mortality are increasing (Global Initiative for Asthma [GINA], 2010), particularly due to the development of western standards of living, where psychological factors have regained notability (Busse et al., 2000). This brings about a worsening in psychological factors and quality of life which entails high socioeconomic costs (direct and indirect) (Sullivan 1996; Suissa 2000).

Since the most remote times of medical history (Maimonides 1990, Alexander 1940, Dunbar 1948), it has been possible to determine a connection between asthma and emotional factors. In this study, besides the epidemiological aspects and the determinant psychopathological issues of this illness, some of the main psychological factors that influence and are influenced by this complex illness are reviewed in a multidimensional systemic vision (Gregerson, 2000; Jasnoski et al., 1994; Dirks et al., 1978).

Parallel to the importance given to biological factors, social and physical variables have also been enhanced, as have conditionings brought about by stress, which intervene and condition psychoneuroimmunohormonal mechanisms in the evolution of the illness (Goodwin & Eaton, 2003).

In the most severe cases of asthma, psychological factors such as depression, anxiety, stress, psychopathology, psychiatric expression of asthma and side effects of medication will be implicated. In this context, the coping mechanisms involved, as well as different life events and other psychosocial conditions are of the utmost importance. The transformation of these people's lives inevitably involves their families, making problem solving difficult, and determining the outcome and the treatment of this pathology (Scott et al., 2007; Fernandes et al., 2010; Thomas et al., 2011; Di Marco et al., 2011).

On the other hand, less adapted behaviours become related to minor compliance in the care of asthma, which leads to the worsening of the symptoms of asthma, causing self-perpetuation mechanisms, with chronically inflammatory processes, pulmonary remodelling and irreversibility in the size of the airways (Rietveld, 2000; Fonseca et al., 2004).

Therapeutically, in people with moderate to severe asthma, besides the usual, preventive and pharmacological approaches, it is essential to turn to psychoeducational and

multifamily programmes, in order to increase the control of the illness, and allow more efficient treatment (Yorke et al., 2007; Smith et al., 2007).

It is in this multisystemic context only by deepening the reciprocal relationships among psychological and biological, family and social factors can one find answers for the enormous complexity of the asthmatic illness. As a corollary of this, the confirmation that only a sufficiently widespread intervention that simultaneously combines the premises previously formulated, will allow an increased therapeutic effectiveness (Fernandes, 2009).

This conceptual transformation into a multifactorial model influences also methodologically the psychosomatic research (Gregerson, 1995). The focus of this approach is based not so much on the causes (as in the linear model) but above all, in intervention and treatment (Mathison, 1993; Stout & Creer, 1997).

Illustrating this, two studies will be presented. The first one, Psychological and Psychosocial Factors in Asthma, will study the influence of the psychological (anxiety, depression, psychopathology) and psychosocial variables of asthmatics with the clinical variables (symptoms, spirometry, inflammatory marker, severity and duration) and morbidity (quality of life, control of asthma, medication, use of health care and absenteeism). In the second study, Psychoeducational and Multifamily Interventions in asthma will presented the effectiveness of these interventions in this illness.

2. Clinical review

Asthma is a chronic inflammatory disease of the airways, which has a great impact on the quality of life of these patients.

In Portugal, as in the majority of western countries, asthma is increasing, which brings about high socioeconomic costs and an increase in mortality and morbidity (GINA, 2010).

For a long time the involvement of psychosocial factors in this disease has been known. Among different respiratory illnesses asthma presents the most profound links between psychological, social, biological and physiological factors. This is why it is considered the prototype of psychosomatic diseases (Isenberg et al., 1992; Lehrer et al., 1993; Mackenzie, 1886).

Much has been achieved since the 1960s, with the psychoanalytic approach to asthma in children, viewed as crying repression (French & Alexander, 1941).

Great progress has been made in the field of medical knowledge namely concerning the neuroimmunohormonal mechanisms involved in the etiopathogenesis of this disease. There is increasing evidence that the immune system is not working autonomously. In spite of this it will be connected with many psychophysiological processes under the regulatory modulation of the brain (Ader & Cohen, 1985). This branch of study we call psychoneuroimmunology. In this way it makes sense that we speak in the long term about changes that can stabilize resistance to the disease. This individual stability could be organized in each patient's personality structure, which could confront the different challenges and stress events of daily life (Goldstein & Dekker, 2001).

However the precise physiological mechanisms involved are very complex, needing more profound research. The psychological disorders seem to produce systemic effects in the immune system function, in metabolic and hormonal processes and in the peripheral and central nervous system, in interactional and reciprocal mechanisms instead of being focused on one organ, as was commonly thought for a long time (Kang et al., 1997; Cohen et al., 1991; Rietveld & Everaerd, 2000; Di Marco et al., 2011).

Nowadays in a more realistic perspective, it is considered that negative emotions (fear, panic, anger, anxiety and depression) are linked in a fluctuating process of bronchoconstriction of the airways, based on a mechanism of worsening crises of asthma (Hollaender & Florin, 1983; Silverglade et al., 1994; Lehrer, 1998; ten Brinke et al., 2001).

In an indispensable holistic vision of this disease the psychological aspects become inseparable from the remaining symptoms when it is a question of making a diagnosis or prognosis or treating asthma (Lehrer et al., 2002).

It is well known that these patients' behaviour strongly influences the course of the illness and the treatment, determining the exposure to allergic factors, in the perception and assessment of the symptoms, in the search for adequate medical care and compliance with the therapeutic plan, being strongly predictive for the frequency and severity of the worsening of the disease (Levy, 1994; van der Berg et al., 1997; Miller & Hotses, 1995; Devriese et al., 2000).

Determinants of this behaviour are indubitable the psychopathology and familiar disorganization which is reflected in the worsening of the disease, in a decrease in quality of life as well as in the increasing health care costs involved. In some more extreme conditions these factors increase risk to life (Nouwen et al., 1999).

Near-fatal asthma deserves scrutiny due to the severity of these events and because of its impact on subsequent asthma morbidity and healthcare costs. The first studies emphasized the role of psychological variables (Campbell et al., 1994; Strunk et al., 1999; Innes et al., 1998; Di Marco et al., 2011).

Furthermore, special attention has to be devoted to the subgroup of severe asthma which is difficult and complex - implying avoidance of multiple environmental stimuli, with a variety of medications for controlling chronic inflammation or acute broncho-dilatation, with complex planning and high costs (Boulet et al., 1991; Woller et al., 1993; Kelloway et al., 2000).

Besides that, knowing that asthma is not a behavioural disease, there is evidence that some changes in some asthmatic groups can condition the evolution of the disease. On the other hand there is also evidence that asthma has a role in the development of some psychiatric diseases (Lehrer et al., 2002; Scott et al., 2007).

Some negative emotions, particularly panic and depression, even not severe enough to be classified as psychiatric disorders, can produce respiratory effects and lead to worsening of asthma, directly by psychophysiological effects or indirectly by neglecting self-management of the illness. Conversely, these emotional disorders can also be worsened by asthma itself (Nouwen et al., 1999; ten Brinke et al., 2001; Lehrer et al., 2004).

A prospective Swiss community-based longitudinal cohort study (Hasler et al., 2005) reported that having a diagnosis of asthma may result in the subsequent development of panic in some patients with an odds ratio of 4.5. On the other hand, the same study also reported that the presence of panic disorder predicted subsequent asthma with an odds ratio of 6.3, suggesting that psychological dysfunction may precede the development of asthma.

A UK primary care survey published in 2007 (Cooper et al., 2007), reported higher anxiety and depression scores in adults with asthma than the general community, and a prevalence of panic disorder of 16% in those with asthma.

There are other psychological factors with a similar relationship to asthma worsening, which deserve a deeper study, particularly personality characteristics and their relation to the perception of asthma symptoms. The state of the art pinpoints for endorphin activity on the basis of this respiratory sensitivity (Rietveld et al., 2000).

In a recent study (Fernandes et al., 2005) the predominance of neurotic characteristics in asthmatic patients was confirmed. They also presented lower extroversion, openness to experience, agreeableness and conscientiousness when compared to the general population. These characteristics were linked to the severity and duration of the disease.

On the other hand, an increasing consensus is becoming established concerning the emotional triggers of asthma, focusing on psychophysiological mechanisms. This is demonstrated in recent studies where in response to emotional states there is a bronchoconstriction as well as registered cardiovascular and electrodermal modifications. Particularly in asthma the respiratory reaction in the airways is well known, when psychologically induced, including the variations in airways narrowing, which characterize the typical fluctuations of the disease (Lehrer et al., 2003, 2004).

Nowadays bronchoconstriction in asthma is defined by direct sympathetic nervous system action or indirect parasympathetic nervous system action by a rebound effect (Manto, 1969; Isenberg et al., 1992; Lehrer et al., 1997), under some specific psychological states (sadness, stress, etc.), or by an inflammatory reaction. Although it remains less well-investigated, it is the last characteristic component in the pathology of asthma, i.e., blood vessel proliferations with increased airways wall thickness, as well as mucus hypersecretion (Lehrer et al., 1998). In some patients, stress in particular is the essential trigger for asthma attacks. Anxiety symptoms in asthmatics have been revealed as strong predictors of respiratory illness in those patients. Besides that, anxiety and depression seem to be much more prevalent in the asthmatic population than in the normal one (Rietveld et al., 2000; Thomas et al., 2011).

Different surveys using different methodologies and instruments indicate that anxiety and depression disorders are up to six times more common in people with asthma than in the general population (Goodwin & Eaton, 2003; Lavoie et al., 2006).

In a recent study (Fernandes et al., 2010) the high prevalence of anxiety in asthmatic patients as well as its associations with worse subjective asthma outcomes and increased use of medications/healthcare services was confirmed.

Anxiety and depression are also particularly reported with severe and difficult to control asthma (Heaney et al., 2005) and impaired emotional coping mechanisms (Lavoie et al., 2010).

Both psychological manifestations inherent in the asthmatic process itself and other clinical situations that can be asthma like, or present some aspects of this illness, have in core genesis a common mechanism: psychosomatic structure (Horton et al., 1978).

Some of that asthma like illnesses have present in their origin above all a psychological mechanism. These kinds of clinical expressions can vary from somatoform disorder to factitious or conversion disorder. In any case it is mainly a functional disturbance, with a physiological minor component (Luparello et al., 1968).

From an investigational perspective there has been a huge change in the techniques used. In the majority of the research, scientists look for physical data when trying to understand this complex system, where psychological factors and emotions are involved.

In this context, some respiratory changes are measured and studied, in some experiments with emotional content in films (Levenson, 1979), in contrast with saline solution inhalation, both by the action of suggestion (Luparello, 1968; McFadden et al., 1969; Neild & Cameron, 1985).

In spite of this, all researchers are using a model, which follows a linear mechanism of thinking. According to some authors (Ford, 1987; Ford & Urban, 1998), who mostly reflected on psychosomatic methodology research, this paradigm is considered completely inappropriate since we involve the behavioural component. In none of these studies, for

example, was the individual and unique experience of each patient taken into account, neither were their past nor their future hopes, considered as a part of the study context.

In fact, any biological, physical or chemical system works like a complex system in which the inherent proprieties are not totally explained, by each constituent part (Gallagher & Appenzeller, 1999). This kind of approach has given rise to some findings in the chemical field (Whitesides & Ismagilov, 1999) in biological signal systems (Weng et al., 1999) and the nervous system (Koch & Laurent, 1999).

Alternatively a new model was suggested, with particular relevance to human being studies. In this, as underlined by Borkovec (1997), the involved processes are linked in a nonlinear dynamic, just as with attention, thinking, images, memory, emotion, physiology and behaviour, all in a permanent interaction, and answering to interpersonal and environmental changes, with a background of biological and developmental history.

In an attempt to adapt this model to the investigation of emotional phenomena in asthma, it will probably be as difficult as to adapt it to the chemical field (Whitesides & Ismagilov, 1999). This becomes even more difficult if we take into consideration that asthma is particularly sensitive to the initial conditions with small variations, having a great number of independent components, which interact in multiple pathways, through which all of these mechanisms could be involved. These conditions raise a multiplicity of potential respiratory patterns.

Through this kind of alternative approach, we will be able to allow a draw study project based above all on the reality of the phenomena investigated. This will bring us close to the necessary conditions to finally get solid evidence in the clarification of the complexity of all of these mechanisms involved with stress and emotions in the present disease. Not only will we get solutions for centuries of old mysteries but it will be possible to have new approaches in the treatment of asthma (Gallagher & Appenzeller, 1999; Koch & Laurent, 1999).

It is in this new contextualization that the importance of psychoeducational programs in asthma is growing. The preliminary data about this intervention gives emphasis to educational, communicational and self-efficacy aspects (Yorke et al., 2007; Fernandes, 2009).

There are already some series of randomized multicenter educational programmes for asthma (Taitel et al., 1995; Kotses et al., 1995; Wilson et al., 1996; Bruzzese et al., 2001). The focus of these programmes is in the clarification of the importance of specific components of the illness. In spite of this, feedback to patients with an assessment of these educational programmes is lacking, as well as an adaptation into short interventions that can work in clinical practice or even in a multifamily context (McFarlane et al., 1995; Devine, 1996; Fernandes, 2009).

Furthermore, it will be important to establish this kind of intervention in more specific groups, such as children with more vulnerability in asthmatic crises, people in high risk groups where stress clearly triggers the worsening of the disease (Bernard-Bonnin et al., 1995; Smith et al., 2005).

There is also some relevance of specific programmes for tobacco reduction, with use of psychotherapy, particularly in the cognitive and family therapy fields. These studies took a privileged focus on the control and treatment in daily life, of this complex chronic disease (Irvine et al., 1999; Silagy, 1999; Gustafsson & Cederblad, 1986; Lask & Matthew, 1979; Sun et al., 2010).

Another important aspect is the identification of some specific characteristics of these patients (in terms of severity, personality and even psychological aspects) in subpopulations that most benefit from these education programmes. Eventually the longitudinal assessment in different contexts will be fundamental.

In conclusion, from a research perspective, a distinct kind of approach will be necessary, based on a reality of these phenomena studied, that allows association mechanisms to be established among multiple factors involved, leading to a more modern methodology in a systemic framework, that puts emphasis on the multifactorial model (Fernandes, 2009).

3. Study 1: Psychological and psychosocial factors

3.1 Objectives

The present study aims to study the influence of psychological factors (state and trait anxiety, anger, depression, psychopathology) and psychosocial variables of asthma with clinical characteristics (spirometry, inflammatory marker, severity and duration) and morbidity criteria (quality of life, control of asthma, medication, use of health care services and absenteeism).

The second aim is to study the integration of these data into the cultural diversity of the present population, from a demographic perspective.

3.2 Methods

In this transversal study, 299 outpatients of the Immunoallergology department of the S. João Hospital, of both sexes, were recruited with asthma diagnosis, between the ages of 17 and 75 years.

With the 217 patients that participated, a psychiatric clinical interview was carried out, and psychiatric clinical cases were excluded, by the General Health Questionnaire – GHQ-28 (Goldberg & Hillier, 1979), as well as alcohol and drug abuse cases. Inclusion criteria were previous medical diagnosis of asthma and specific criteria (anti-asthmatic therapy, tests of unspecified bronchial hyper-reactivity and bronchodilation, inflammatory marker, spirometry).

Thus, 195 patients were studied according to the duration of the illness, symptoms, morbidity criteria (use of health care, medication and absenteeism), spirometry (FEV1, PEF), test of bronchial hyper-reactivity (PD20 metacolina), inflammatory markers (FENO), severity of asthma (GINA, 2010) and atopy and rhinitis.

They were evaluated according to the following scales: Self Anxiety Scale – SAS (Zung, 1971), State-Trait Anxiety Inventory – STAIY (Spielberger, 1983), State-Trait Anger Expression Inventory – STAXI (Spielberger, 1988), Beck Depression Inventory – BDI (Beck et al., 1961), Hopkins Symptom Distress Checklist 90-Revised – SCL90R (Derogatis & Savitz, 1999), Ways of Coping with Asthma in Everyday Life – WCAEL (Aalto et al., 2002), Mini Asthma Quality of Life Questionnaire – MiniAQLQ (Juniper et al., 1999a) and Asthma Control Questionnaire – ACQ (Juniper et al., 1999b).

Patient informed consent was obtained and the study was approved by the hospital Ethics Committee.

3.3 Results

In this sample (n=195), most of the patients were female (76.4%), with ages ranging from 17 to 75 years. The mean (sd) age was 38(14.5) years. Most of the patients have low education (70.2%). There was a predominance of low and very low classes (72.4%), according to the Graffar social classification (Graffar, 1956).

The mean duration of the disease was 19.8(14.0) years. The severity of the illness was distributed in the following way: Intermittent (8.2%), Mild persistent (12.8%), Moderate persistent (12.8%) and Severe persistent (66.2%).

The respiratory values found were: spirometry FEV1 83.5(22.4) (min.19%, max.120%), inflammatory marker FENO P50 28 (min.4, max.222). Most of these patients concomitantly have atopy (80.9%) and rhinitis (60.3%).

Total = 195		
Age (years) mean (sd)	38.0	(14.6)
Gender n(%)		
Male	46	(23.6)
Female	149	(76.4)
Education n(%)		
≤ 9	137	(70.2)
10-11	37	(19.0)
> 12	21	(10.8)
Socio-economic classification n(%)		
High and very high	16	(8.2)
Median	38	(19.5)
Low	59	(30.3)
Very low	82	(42.1)
Asthma duration (years) mean (sd)	19.8	(14.0)
Asthma severity n (%)		
Intermittent	16	(8.2)
Mild persistent	25	(12.8)
Moderate persistent	25	(12.8)
Severe persistent	129	(66.2)

Table 1. Demographic and clinical characteristics of sample

From a psychological point of view, the asthmatics of the sample were individuals with a high level of anxiety state (70%): 13.3% had scores suggesting anxiety and 56.4% suffered from high-anxiety (Ponciano et al., 1982).

Considering the anxiety trait, assessed by STAIY, there was a mean (sd) value of 40.82 (12.18). On this scale, state-anxiety had a mean (sd) of 44.8 (13.16).

In this sample, the mean values of contained and manifested anger (mean 15.94, sd 4.05; mean 13.31, sd 12.0) were much higher than the mean standard results found in the normative Portuguese population (Martins, 1995).

Additionally the analysis of the degree of depression, assessed by BDI, allowed us to conclude that in the majority of the sample (72%) depression was absent. Only 6.2% of these patients revealed symptoms of severe and 22% mild/moderate depression.

Psychopathology assessed in the different list of symptoms of Hopkins-Review SCL-90-R, had in general normal values, with the exception for somatization (mean 1.4, dp 0.8) and anxiety (mean 1.06, dp 0.68), higher than the mean values standardized for the Portuguese population.

In the present sample, the most important coping mechanism found was hiding asthma, with a mean (dp) value of 13.08 (2.21), followed by worry with the disease, with a mean (dp) value of 9 (2.12), corroborated by the global score (mean 82, dp 7.63).

The mean (sd) values for quality of life, according to the MiniAQLQ were 4.9 (1.3), with a minimum of 2 and a maximum of 7.

For asthma control, assessed by ACQ (with 0 FEV1), P50 (min.0 /max. 5.2), the mean (sd) was 1.5 (1.2).

In the present study we verified a correlation between sex (higher in women) and anxiety ($p<0.001$), as well as depression ($p=0.000$) and psychopathology ($p=0.001$).

There was a positive correlation between age and anxiety state ($p=0.006$) and trait ($p=0.037$), depression ($p=0.001$), psychopathology ($p=0.025$), as well as coping mechanism ($p<0.001$).

A worsening in breathing was noted (spirometry values) only with psychopathology - obsession ($p=0.05$).

On the other hand, these psychological variables (anxiety $p\leq 0.001$, psychopathology - somatization $p=0.001$) were related to the decrease in the inflammatory marker, indicating higher health care use and an increase in medication intake (mainly preventative).

Above all anxiety state was related to more hospitalization ($p=0.007$) as well as non-scheduled consultations ($p=0.008$) and routine ones ($p=0.001$).

Anxiety and depression also increased absenteeism ($p=0.011$; $p=0.017$).

These psychological variables also increased with the severity ($p\leq 0.001$; $p\leq 0.001$) and with the duration of the disease ($p=0.002$; $p=0.023$). However, psychopathology only increased with severity ($p=0.002$).

Another result found, was that anxiety ($r=0.638$; $p\leq 0.001$), anger ($r=-0.343$; $p\leq 0.001$) and depression ($r=-0.527$; $p\leq 0.001$) worsened the quality of life (Figure 1 and 2).

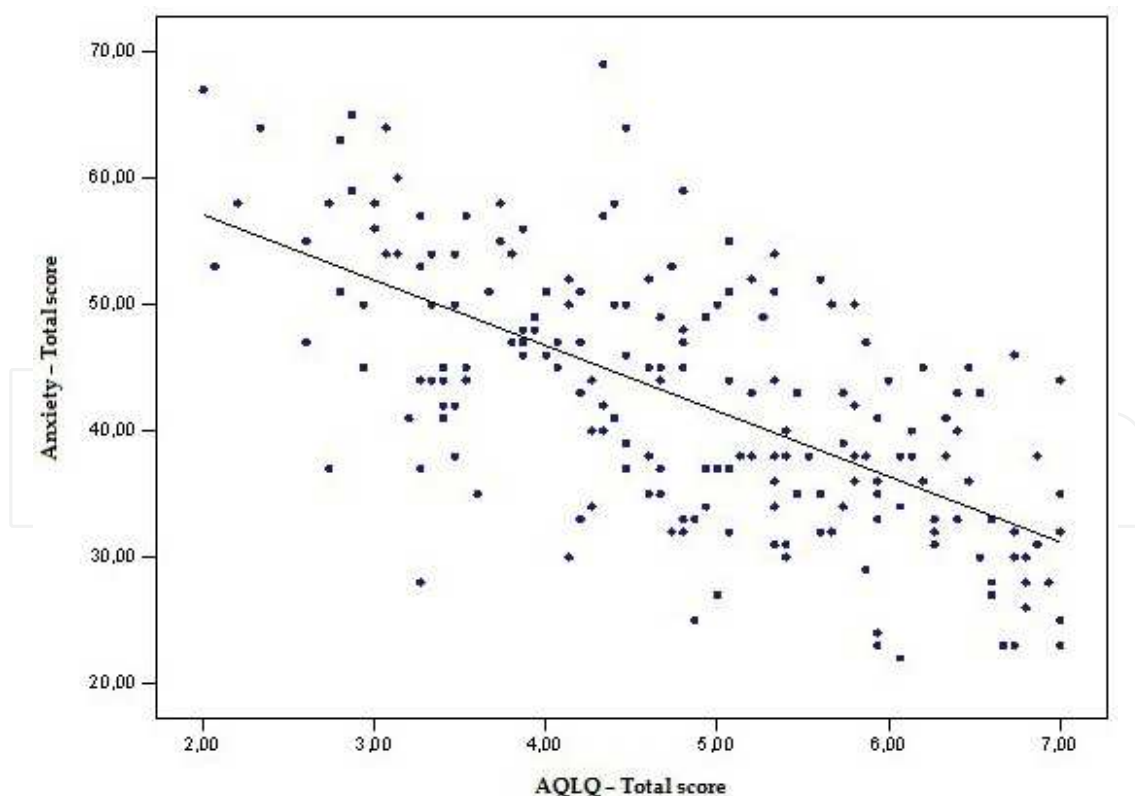


Fig. 1. Correlation between anxiety and quality of life

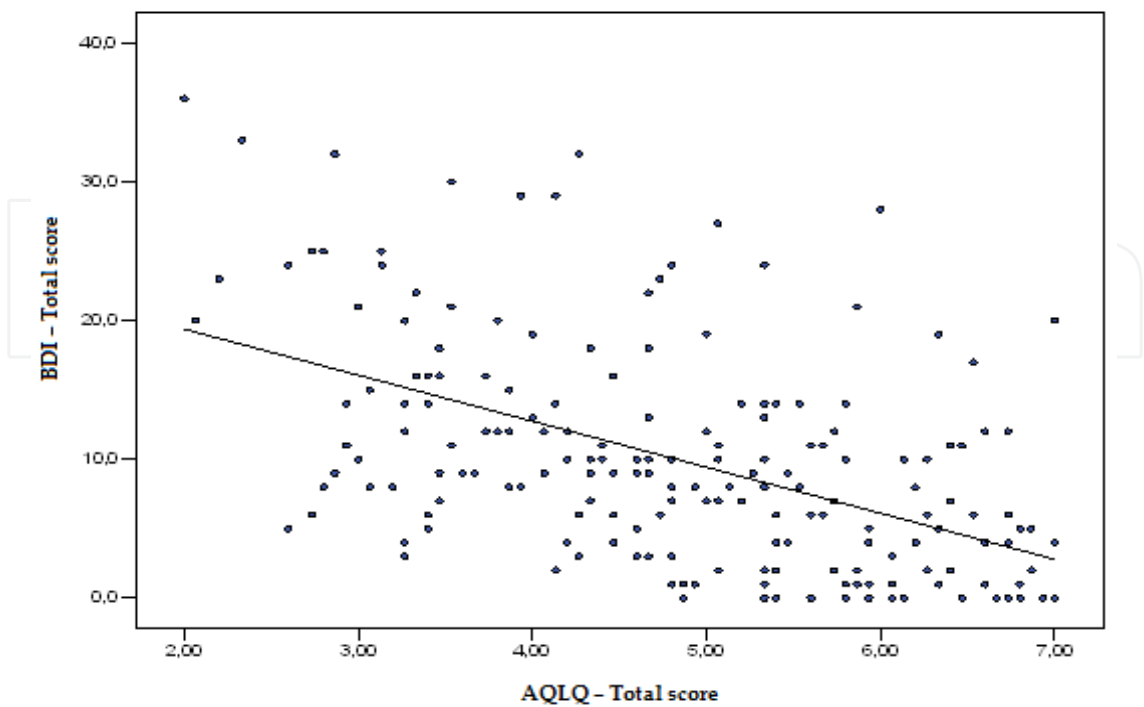


Fig. 2. Correlation between depression and quality of life

The control of asthma was correlated with anxiety state ($r=0.554$; $p\leq0.001$) and trait ($r=0.357$; $p=0.000$), as well as anger ($r=0.221$; $p=0.016$) (Figure 3). Another clinical variable was also associated with control of asthma, which is depression ($r=0.656$; $p\leq0.001$) (Figure 4).

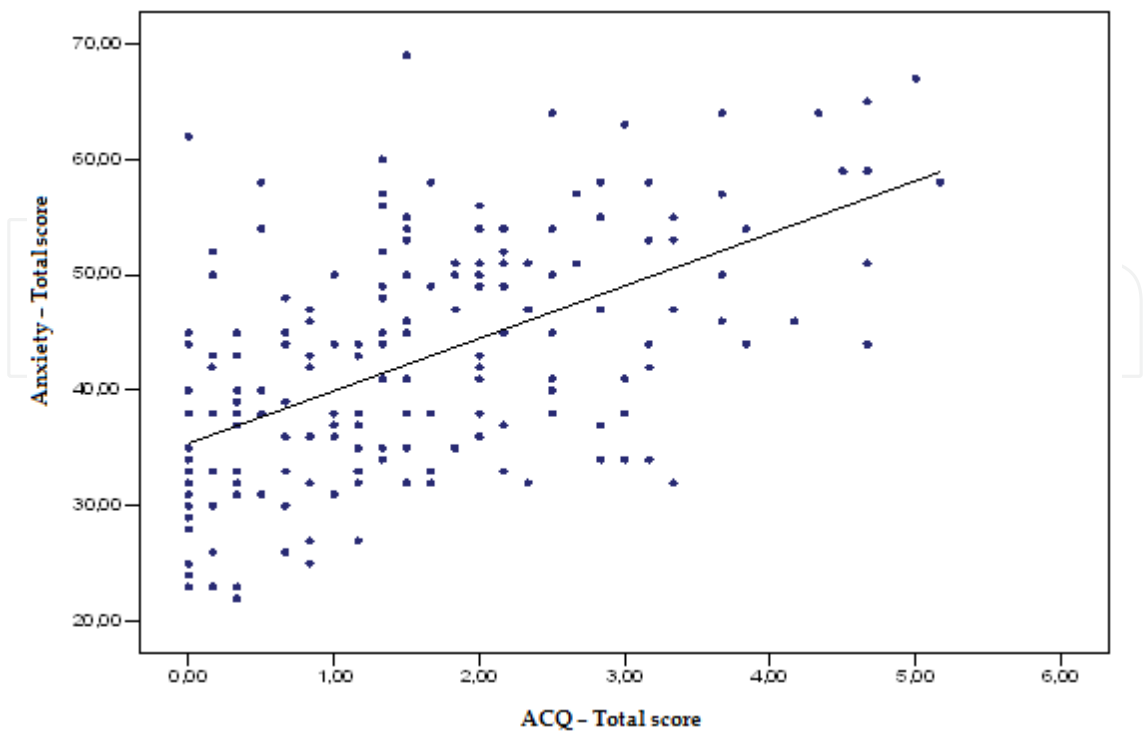


Fig. 3. Correlation between anxiety and asthma control

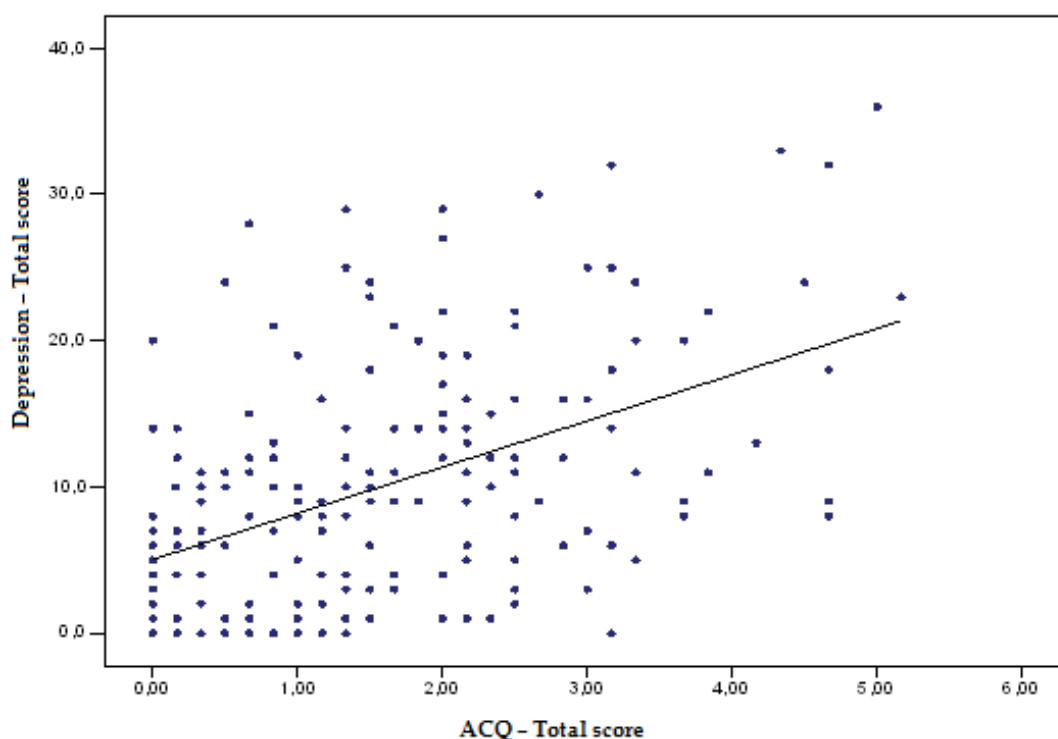


Fig. 4. Correlation between depression and asthma control

Increase in age implied better disease adaptation ($p \leq 0.001$). The severity of asthma sustained lower total coping mechanisms ($p = 0.021$), as well as positive reappraisal ($p = 0.009$), assessed by WCAEL.

Of special note, the coping mechanism restricted lifestyle ($p = 0.021$) increased with duration of the disease. The positive reappraisal had a negative correlation with the duration of the disease ($p = 0.028$).

Absenteeism was also directly related to restricted lifestyle and reverse with seeking information, the two coping mechanisms.

The coping mechanism worry with asthma decreased the quality of life ($r = -0.239$; $p = 0.044$). The most mobilizing mechanism for looking for medical care: consultation ($p = 0.014$) was restricted lifestyle. An opposite implication for denial ($p = 0.015$) mechanism was found, and leading to less intake of corticosteroids.

3.4 Discussion and conclusion

According to the standard values for the Portuguese population (Ponciano et al., 1982), this group has a clear predominance of anxiety in 70% of the sample, as defined in the literature (Vila et al., 2000; Goodwin & Eaton, 2003). This is reinforced by the high levels of anger-in as well as anger-out, that almost all duplicated in this sample (when compared to the normal values of general population), which may be related to more physiological activation, as found for the studies with hypertension (Spielberger & London, 1990).

In contrast we found lower psychopathology levels, particularly depression, probably explained by the selection criteria of the present sample and because the influence of the well-known low compliance in this kind of study of these particular patients.

Anxiety, depression, psychopathology and coping increased with age. However, only anxiety was correlated with low socioeconomic level, as corroborated in other studies (Rumbak et al., 1993).

In the present sample a high correlation with sex, especially for women was found with anxiety, depression and psychopathology, which is in accordance in the previous studies (Eysenck, 1969; Dalton et al., 1975; Mayer-Cross et al., 1969; Thomas et al., 2011).

Anxiety, anger and depression correlated with the duration of asthma episodes and their acuteness (in the GINA classification), which is in agreement with former studies (Mrazek et al., 1998; Sandberg et al., 2000; ten Brinke et al., 2001; Barton et al., 2005; Wainwright et al., 2007; Dahlem et al., 2009), associating the early onset of asthma with a negative impact on psychological adaptation to the disease, which implies the development of more clinical anxiety and depression.

The use of healthcare services by asthmatic patients as well medication (especially relief and preventive ones) was also directly linked with anxiety. Particularly, anxiety is predicted due to hospitalizations (Dirks et al., 1978, 1981; Kinsman et al., 1982) and their duration (Put et al., 1999).

These results agree with others, who argue that high anxiety leads to poor discrimination between anxiety symptoms and breathing symptoms, thus leading to an overuse of medical care (Spinhoven et al., 1997; Cluley & Cochrane, 2001). There was also a significant relationship between a great number of hospital admissions and higher scores of anxiety, which strengthens the conclusions of previous studies, where anxiety is predictive of more hospital admissions (Bender et al., 2006; Prueter & Norra, 2005) and longer duration.

There was a relationship between exhaled nitric oxide (FENO) and anxiety and somatization. This marker for airway inflammation had a negative correlation with anxiety. In other words, as the levels of anxiety increase, there is evidence of a decrease in inflammation. A possible interpretation of this inverse association may be found in the characteristics of high anxiety of this sample, calling for the use of greater medical care (ten Brinke et al., 2001b). In turn physicians may be influenced by the increased expression of symptoms by the patients. As a consequence more anti-inflammatory treatment is prescribed as patients are identified as more acutely ill (Hibbert & Pilsbury, 1988; Hornsveld & Garssen, 1996). The inflammatory marker decreases because it is particularly sensitive to changes in medication, specifically corticosteroids (Chetta et al., 1998). However, the changes are not reflected in other, less sensitive markers of this disease, namely, lung-function (FEV and PEF), for which no significant relationship with anxiety was found. This lack of association between lung function and anxiety has been previously reported (Thomas et al., 2001).

This tendency toward increasing anxiety was seen for the greater degrees of asthma severity. This agrees with studies in which anxiety in asthmatics is seen as a risk factor for increase in asthma morbidity and mortality (Wright et al., 1998; Forsythe et al., 2004). A similar correlation was found for psychopathology which is corroborated by other studies (Chetta et al., 1998), namely when this is linked with near-fatal asthma attacks (Yellowees et al., 1988; Boulet et al., 1991; Garden et al., 1993; Campbell et al., 1995a; McQuaid et al., 2001). This severity was also correlated positively with depression, in accordance with other studies (Strunk et al., 195; Picado et al., 1989; Campbell et al., 1995a; Martin et al., 1995). This relation between depression and severity asthma is particularly relevant in the case of recent bereavement (Levitan, 1985), as well as death by asthma with hopelessness and despair in the days before the relative's death (Miller et al., 1989).

By using STAI-Y, the average values for the anxiety trait (i.e., a measure for an individual's tendency for anxiety) were higher than those found in other studies for the Portuguese population (Santos & Silva, 1997; Silva & Campos, 1998) and that have been used as

standard references. These characteristics agree with some other previous studies (Boulet et al., 1991; Chetta et al., 1998) which argue that there is a strong link between anxiety trait and asthma, as well as a greater manifestation of the symptoms of this ailment (Kinsman et al., 1973; Dirks et al., 1978; Friedman & Booth-Kewley, 1987; Yellowlees & Kalucy, 1990). More recently Rimington et al (2001) further supports this notion and states that as anxiety increases (state and trait) a poorer quality of life is evidenced, and Baumeister et al (2005) makes similar observations between higher anxiety and less asthma control (Thomas et al., 2011).

The present study also recognized worse control of the disease with anger and depression, as found in other studies (Cluley & Cochrane, 2001; Thomas et al., 2011). Is well known that patients classified as non-adherent (those taking less 70% of the prescription) presented high anxiety and depression levels (Zigmond et al., 1983; Thomas et al., 2011).

Corroborating former studies (Dirks et al., 1978; Staudenmayer et al., 1979; Dirks & Kinsman, 1981; Baron et al., 1986; Put et al., 1999), the data from this study suggest that the most anxious patients are more vigilant over their symptoms, use more medication and more often turn to healthcare services for help. With this behaviour they would suffer from great psychological stress with their disease in the short term (higher values of anxiety, with less quality of life associated with asthma), but in the long run it may result in better control over the illness. Thus, this anxiety which is specifically related to asthma can be beneficial, by making the individual aware of the bodily symptoms related to asthma, through a process of focusing attention. However, excessively high levels of anxiety may lead to super-perception of asthma symptoms, with the patient thus becoming more disorganized in behavioural terms, with negative consequences upon the development of the ailment. In this way we may understand the association observed: as the state of anxiety increases, asthma control becomes worse.

The most important coping mechanism in this study was hiding asthma, considered as a passive one. This mechanism as well as avoidance and denial were linked with less mobilized strategies in chronic diseases (Felton et al., 1984; Santavirta, 1997; Osowiecki & Compas, 1999). In other studies, asthma denial has been recognized as an important risk factor for asthma attacks, and more emergency treatment (Dirks et al., 1978; Miller, 1987; Steiner et al., 1987; Yellowlees & Ruffin, 1989; Lavoie et al., 2010). The coping mechanism in general (total scores) and particularly the positive reappraisal were also correlated with greater severity of asthma.

Another important mechanism found in this sample was worry about the disease, which is considered as the most emotionally involving, correlated with poor quality of life. This is in accordance with the worst adjustment to the disease, related to emotional involvement (Bombardier et al., 1990; Landreville & Veniza, 1994; Scharloo et al., 1998).

Related also with poor quality of life are depressive symptoms (Goethe et al., 2001), which seem to measure negative feelings as well as neuroticism (Koivumaa-Honkanen et al., 2000), and this is corroborated in the present study.

With these results we are witnessing a multiple confluence of biological, environmental, psychological and social factors in asthma, as well as in its evolution, treatment and prognosis, understandable in the complexity of systemic and multiple interaction of all these factors, which influence and are simultaneously influenced by the disease.

The behavioral disorders found are translated by clinical and morbidity criteria, leading to higher use of healthcare and medication, and absenteeism, with poorer disease control and quality of life.

In this way, the need for better and more accurate assessment emerge, not at a symptomatic level but also discriminating different types of anxiety, depression, associated psychopathology that determine the diagnosis and development of this disease. In future studies a cluster selection of individuals will be required who combine physical and psychological characteristics, above all with severe or unstable asthma, with more adequate clinical interventions. This is taking into account that even if we cannot change personalities, we can at least modify behaviour, with efficacy in healthy habits and attitudes, namely concerning compliance to treatment.

4. Study 2: Psychoeducational and multifamily interventions in asthma

4.1 Objectives

This study aims to analyse the effects of psychoeducational and multifamily interventions in asthma, in biological variables (spirometry and inflammatory marker), morbidity criteria (health care use, absenteeism, medication, quality of life and control of disease) and psychological outcomes (anxiety, depression and coping mechanisms).

4.2 Methods

We conducted a five-month prospective study, randomized with simple occultation, with two intervention groups and a control group, according to the criteria defined and presented in the previous study, where 195 patients were studied. Of these, the ones with moderate or severe persistent asthma were selected. This Random Control Trial was carried out in the Allergy & Immunology outpatients' department of the University Hospital S. João in Oporto. The randomization resulted in the balanced inclusion of 141 patients, divided into three groups (according to levels of anxiety and depression). The studied sample, in two observations, was the following: Psychoeducational Group (PG) intervention and usual pharmacological treatment (n=38), Multifamily Group (MG) intervention and usual pharmacological treatment (n=29), Control group (CG) with only usual pharmacological treatment (n=44) (Figure 5).

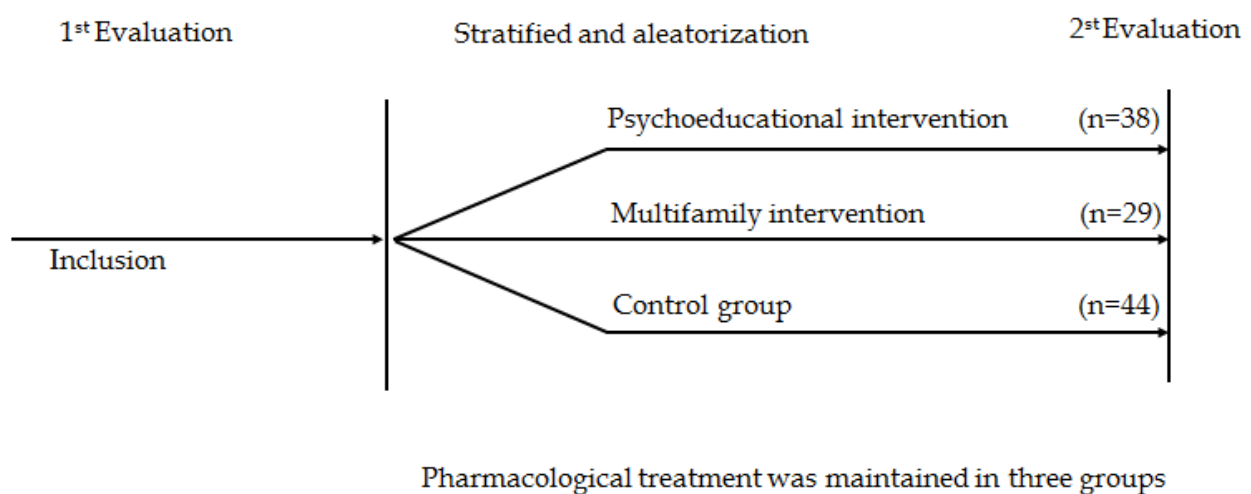


Fig. 5. Clinical study design

For comparison with the evaluation made in the second study, the following scales of evaluation were used: Self Anxiety Scale – SAS (Zung, 1971), State-Trait Anxiety Inventory – STAIY (Spielberger, 1983), Beck Depression Inventory – BDI (Beck et al., 1961), Ways of Coping with Asthma in Everyday Life – WCAEL (Aalto et al., 2002), Mini Asthma Quality of Life Questionnaire – MiniAQLQ (Juniper et al., 1999a) and Asthma Control Questionnaire – ACQ (Juniper et al., 1999b).

They were still compared according to their asthma symptoms, spirometry, inflammatory marker and morbidity criteria.

All psychological and clinical measures were assessed twice, before and after interventions. Only adding information and knowledge became incomplete (Costa & MacCrane, 1987; Clark et al., 2002). With these interventions the aim is not to modify personalities, but change behaviour and attitudes (Costa & MacCrane, 1986).

In this context, the general principles of two interventions included both transmission of information, promoting behaviour change and improvement of self-efficacy. This implies a bidirectional process with interactions between health professionals and asthmatic patients and families. There are some objectives in this communication, mainly in answer to different issues, erasing false constructs, reduction of anxiety due to illness and promoting healthy habits and attitudes

Specifically for the **Psychoeducational programme**, the present intervention was focused on results in three levels of learning: knowledge transmission, education for instrumental attitudes and finally integration of the former. This empowered the patients by increasing self-efficacy and improvement in problem-solving of asthma. These sessions were not only didactic but also interactive.

The **Multifamily programme** was based on three distinct components: educational (sharing of experiences between families and patients, mediation by psychotherapists), social network (cross over difficult situations) and problem-solving (extending solutions, training strategies to deal with illness). This intervention was structured as a “group within a group”, based on the Multifamily Discussion Group of Gonzalez and Steinglass (Gonzalez et al., 1986, Gonzalez & Steinglass, 2002; Steinglass, 1998).

4.3 Results

The intervention groups and control group had balanced demographic, psychological and clinical characteristics (Table 2).

Considering the total sample of asthmatics (n=141), the majority was female (78.7%), with a mean age (sd) of 39.3 (14.2). There was also a predominance of lower socio-economic classes (75.1%). The mean duration of the disease was 21.5 (14.8) years and most of the patients had severe persistent asthma (76.6%).

There was an improvement in both intervention programmes, in psychological variables. Depression only achieved statistical significance in the PG ($p \leq 0.05$), but anxiety state was significant in all groups (MG $p < 0.01$; PG $p < 0.01$), as well as anxiety trait (MG $p < 0.001$; PG $p < 0.01$) (Table 3).

In the MG, there was a relevant decrease in the coping mechanism of worry with asthma ($p = 0.000$).

In both programs there was an improvement in the quality of life (MG $p < 0.05$; PG $p < 0.01$), increasing in 0.8U in PG and 0.5U in MG, taking into consideration effective results since 0.5U, according Juniper's references (Juniper et al., 1999a).

	Multifamily (n=46)	Psychoeducacional (n=47)	Control (n=48)
Age (years) mean (sd)	40.2(16.3)	37.8(14.1)	40.0(12.3)
Gender n(%)			
Male	7(15.2)	8(17.0)	15(31.3)
Female	39(84.8)	39(83.0)	33(68.8)
Socio-economic classification n(%)			
High and very high	3(6.5)	3(6.4)	5(10.4)
Median	6(13.0)	11(23.4)	7(14.6)
Low	12(26.1)	10(21.3)	14(29.2)
Very low	25(54.3)	23(48.9)	22(45.8)
Disease duration (years) mean (sd)	24.4(15.0)	20.4(14.6)	19.7(14.8)
Asthma severity n(%)			
Moderate persistent	9(19.6)	8(17.0)	16(33.4)
Severe persistent	37(80.4)	39(83.0)	32(66.7)

Table 2. Demographic and clinical characteristics of sample

	MULTIFAMILY (n=29)			PSYCOEDUCACIONAL (n=38)		
	1º Av.	2ª Av.		1º Av.	2ª Av.	
Anxiety state ¹	11.2 (3.3)	9.8 (3.7)	Imp **	11.4 (3.0)	9.4 (2.6)	Imp **
Anxiety trait ²	49.5 (12.4)	38.8 (11.4)	Imp ***	45.8 (11.8)	41.2 (10.7)	Imp **
Depression ³	12.3 (9.1)	11.9 (10.2)	Imp. NS	10.7 (6.9)	8.0 (8.3)	Imp *
Quality of life ⁴	4.5 (1.3)	5.0 (1.4)	Imp. *	4.3 (1.2)	5.1 (1.3)	Imp **
Asthma control ⁵	2.0 (1.1)	1.5 (1.4)	Imp *	1.9 (1.1)	1.5 (1.3)	Imp *

Note: p<0.001 ***; p<0.01**; p<0.05*; NS - non-significant, imp. - improved; ¹SAS; ²STAI-Y; ³BDI;

⁴MiniAQLQ; ⁵ACQ

Table 3. Psychological and clinical outcomes in experimental groups

There was also an increase in the control of asthma in both groups (MG $p < 0.05$; PG $p < 0.05$). In morbidity criteria, there was a reduction in the use of corticotherapy ($p = 0.01$) in the MG, and in hospitalization ($p = 0.000$) in the PG. There was an improvement in spirometry: FEV1 (MG $p < 0.05$, PG $p < 0.05$) and PEF (MG $p < 0.05$, PG $p < 0.01$).

4.4 Discussion and conclusion

The intention of this pioneer study in Portugal was to contribute to the characterization of the clinical situation of asthmatic patients in a hospital context, as well as the importance of group interventions (mainly educational and communicational) carried out in the context of a multidisciplinary programme (Fernandes, 2009).

Rejecting the linear model of etiological causality, the multisystemic model is strengthened with this psychoeducational intervention, in which all factors influence and are influenced by the illness.

In moderate/severe asthma, besides the usual preventive and pharmacological approaches, it is essential to turn to a widespread intervention: psychoeducational and multifamily programmes, with a multidisciplinary team, to increase the control of the illness and allow therapeutic effectiveness (Wamboldt et al., 1995; Devine, 1996; Steinglass et al., 2002; Yorke et al., 2007).

The innovative therapeutic interventions (Psychoeducational and Multifamily) revealed promising results, as demonstrated in the present study. Namely in both interventional groups, there were good results, with statistically significant improvement in quality of life, asthma control, psychological variables (anxiety state and trait, depression and coping mechanisms) and clinical parameters (spirometry).

With the present intervention we try to demonstrate that behavioural changes brought about, improvement in the psychological parameters, as well as in the clinical parameters.

The present results encourage further studies, with larger samples and longitudinal interventions, in order to evaluate the stability of the positive effects found.

An accurate selection for a therapeutic approach is also necessary to cater for specific characteristics of these patients, more orientated for control and self-efficacy in psychoeducational or solution focused/emotional confrontation for more psychotherapeutic intervention.

Only in this way, can we pursue a holistic comprehension of the complexity of these physiopathological processes involved in asthma, with a more integrated and efficient treatment.

5. Acknowledgements

The author wish to thank J. Fonseca, S. Martins, M. Ribeiro, L. Delgado, A. Costa Pereira and M. Vaz.

6. References

- Aalto, A.M.; Härkäpää, K.; Aro, A.R. & Rissanen, P. (2002). Ways of coping with asthma in everyday life validation of the asthma specific coping scale. *Journal of Psychosomatic Research*, Vol. 53, pp. 1061-1069.

- Ader, R. & Cohen, N. (1985). CNS-immune system interaction conditioning phenomena. *Behavioral and Brain Sciences*, Vol. 8, pp- 379-394.
- Baron, C., Lamarre, A., Veilleux, P., Ducharme, G., Spiet, S. & Lapierre, J.G. (1986). Psycho maintenance of childhood asthma: a study of 34 children. *Journal of Asthma*, Vol. 23, pp. 69-79.
- Barton, C.A., McKenzie, D.P., Walters, E.H. & Abramson, M. (2005). Interactions between psychosocial problems and management of asthma: who is at risk of dying? *J Asthma*, Vol. 42, pp. 249-56.
- Baumeister, H. (2005). [Bronchial asthma and mental disorders -- a systematic review of empirical studies]. *Psychother Psychosom Med Psychol*, May, Vol. 55, No. 5, pp. 247-55.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J. & Erbaugh, J. (1961). An Inventory for Measuring Depression. *Arch Gen Psychiat*, Vol. 4, pp. 561-571.
- Bender, B.G. (2006). Risk taking, depression, adherence, and symptom control in adolescents and young adults with asthma. *Am J Respir Crit Care Med*, Vol. 173, No. 9, pp. 953-7
- Bernard-Bonnin, A.C., Stachenko, S., Bonin, D., Charette, C. & Rousseau, E. (1995). Self-management teaching programs and morbidity of pediatric asthma: a meta-analysis. *Journal of Allergy and Clinical Immunology*, Vol. 95, pp. 34-41.
- Bombardier, C.H., D'Amico, C. & Jordan, J.S. (1990). The relationship of appraisal and coping to chronic illness adjustment. *Behav Res Ther*, Vol. 28, pp. 297-304.
- Borkovec, T.D. On the need for a basic science approach to psychotherapy research. *Psych Sci*, Vol. 8, pp. 145-147.
- Boulet, L.P., Deschesnes, F., Turcotte, H. & Gignac, F. (1991). Near-fatal asthma: Clinical and physiologic features, perception of bronchoconstriction, and psychologic profile. *J Allergy Clin Immunol*, Vol. 88, No. 6, pp. 838-846.
- Bruzzese, J.M., Markman, L.B., Appel, D. & Webber, M. (2001). An evaluation of Open Airways for Schools: using college students as instructors. *Journal of Asthma*, Vol. 38, pp. 337-342.
- Busse, W.B. (2000). A 47-year-old woman with severe asthma. Clinical crossroads. *JAMA*, Vol. 284, pp. 2225-2233.
- Campbell, D.A., McLennan, G., Coates, J.R., Frith, P.A., Gluyas, P.A., Latimer, K.M., Luke, C.G., Martin, A.J., Roder, D.M. & Ruffin, R.E. (1994). A comparison of asthma deaths and near-fatal asthma attacks in South Australia. *Eur Respir J*, Vol. 7, pp. 490-497.
- Campbell, D.A., Yellowlees, P., McLennan, G., Coates, J.R., Frith, P.A., Gluyas, P.A., Latimer, K.M., Luke, C.G., Martin, A.J. & Ruffin, R.E. (1995a). Psychiatric and medical features of near fatal asthma. *Thorax*, Vol. 50, pp. 254-259.
- Chetta, A., Gerra, G., Foresi, A., Zaimovic, A., Del Donno, M., Chittolini, B., Malorgio, R., Castagnaro, A. & Olivieri, D. (1998). Personality profiles and breathlessness perception in outpatients with different grading of asthma. *Am J Respir Crit Care Med*, Vol. 157, pp. 116-22.
- Clark, N.M. & Partridge, M.R. (2002). Strengthening asthma education to enhance disease control. *Chest*, Vol. 121, pp. 1661-1669.
- Cluley, S. & Cochrane, G.M. (2001). Psychological disorder in asthma is associated with poor control and poor adherence to inhaled steroids. *Respir Med*, Vol. 95, pp. 37- 9.

- Cohen, S., Tyreli, D.A. & Smith, A.P. (1991). Psychological stress in humans and susceptibility to the common cold. *New England Journal of Medicine*, Vol. 325, pp. 606-612.
- Cooper, C.L., Parry, D.G., Saul, C., Morice, A.H., Hutchcroft, B.J., Moore, J. & Esmonde, L. (2007). Anxiety and panic fear in adults with asthma: prevalence in primary care. *BMC Fam Prat*, Vol. 8, pp. 62.
- Costa, P.T. & McCrae, R. (1986). Personality stability and its implications for clinical psychology. *Clinical Psychology Review*, Vol. 6, pp. 407-423.
- Costa, P.T. & McCrae, R. (1987). Neuroticism, somatic complaints and disease: Is the bark worse than the bite? *Journal of Personality*, Vol. 55, No. 2, pp. 299-316.
- Dahlem, N.K., Kinsman, R.A. & Horton, D.J. (2009). Panic-fear in asthma: requests for asneeded medication in relation to pulmonary function measurements. *J Allergy Clin Immunol*, Vol. 60, pp. 295-300.
- Derogatis, L.R. & Savitz, K.L. (1999). The SCL-90-R, brief symptom inventory, and matching clinical rating scales. In: Maruish (Ed), *The use of psychological testing for treatment planning and outcomes assessment*. Mahwah, NJ. Erlbaum, pp. 679-724.
- Devine, E.C. (1996). Meta-analysis of the effects of psychoeducational care in adults with asthma. *Research in Nursing and Health*, Vol. 19, pp. 367-376.
- Devriese, S., Winters, W., Stegen, K., van Diest, I., Veulemans, H., Nemery, B., Eelen, P., Van de Woestijne, K. & Van den Bergh, O. (2000). Generalization of acquired somatic symptoms in response to odors: A Pavlovian perspective on multiple chemical sensitivity. *Psychosomatic Medicine*, Vol. 62, pp. 751-759.
- Di Marco, F., Santus, P. & Centanni, S. (2011). Anxiety and depression in asthma. *Curr Opin Pulm Med*, Vol. 17, No. 1, pp. 39-44.
- Dirks, J.F. & Kinsman, R.A. (1981). Clinical prediction of medical rehospitalization: psychological assessment with the battery of asthma illness behavior. *J Pers Assessment*, Vol. 45, pp. 608-613.
- Dirks, J.F., Kinsman, R.A., Horton, D.J., Fross, K.H. & Jones, N.F. (1978). Panic-fear in asthma: rehospitalization following intensive long-term treatment. *Psychosom Med*, Vol. 40, pp. 5-13
- Eysenck, H.J. (1969). Research findings with the MPI. In: Eysenck, H.J. & Eysenck, S.B.C., *Personality Structure and Measurement*. London: Routledge & Kegan Paul.
- Felton, B.J., Revenson, T.A. & Hinrichsen, G.A. (1984). Stress and coping in explanation of psychosocial adjustment among chronically ill adults. *Soc Sci Med*, Vol. 18, pp. 889-98.
- Fernandes, L. (2009). Dos Factores Biopsicológicos às Intervenções Multifamiliares e Psicoeducacionais na Asma. Edição Bial.
- Fernandes, L., Fernandes, M., Cruz, R., Gonçalves, R., Martins, S., Rodrigues, J., Almeida, J., Pinto, A. & Vieira, A. (2005). Caracterização da personalidade dos doentes asmáticos. *Revista Portuguesa de Pneumologia*, Jan-Fev, Vol.11, No. 1, pp. 7-34.
- Fernandes, L., Fonseca, J., Martins, S., Delgado, L., Pereira, A.C., Vaz, M. & Branco, G. (2010). Association of anxiety with asthma: subjective and objective outcome measures. *Psychosomatics*, Jan, Vol. 51, No. 1, pp. 39-46.
- Fonseca, J.A., Fernandes, L., Delgado, L., Costa-Pereira, A., Sousa, M., Martins, S., Gomes, S., Moreira, A., Vaz, M. & Castel-Branco, G. (2004). Asthmatic patients with anxiety:

- more symptoms and medication but a better adherence and less Exhaled Nitric Oxide. *Journal Investigational Allergology Clinical Immunology*, Vol. 14, (suppl 1).
- Ford, D.H. & Urban, H.B. (1998). Contemporary models of psychotherapy. A comparative Analysis (2nd ed). New York: John Wiley.
- Ford, D.H. (1987). Humans as self -construction living systems. A developmental perspective on behavior, personality, and health. New York: Erlbaum.
- Forsythe, P., Ebeling, C., Gordon, J.R., Befus, A.D. & Vliagoftis, H. (2004). Opposing effects of short- and long-term stress on airway inflammation. *Am J Respir Crit Care Med*, Vol. 169, pp. 220-6.
- French, T.M. & Alexander, F. (1941). Psychogenic factors in bronchial asthma. *Psychosom Med Monographs*, Vol. 4, pp. 1941.
- Friedman, H.S. & Booth-Kewley, S. (1987). The "disease-prone personality". A meta-analytic view of the construct. *American Psychologist*, Vol. 42, No. 6, pp. 539-555.
- Gallagher, R. & Appenzeller, T. (1999). Beyond reductionism. *Science*, Vol. 284, pp. 79.
- Garden, G.M. (1993). Psychiatric and social aspects of brittle asthma. *Thorax*, Vol. 48, pp. 501-505.
- GINA - Global Initiative for Asthma (2010). *Global Strategy for Asthma Management and Prevention*. National Institutes of Health. National Heart, Lung, and Blood Institute. Available at: www.ginasthma.org.
- Goethe, J.W., Maljanian, R., Wolf, S., Hernandez, P. & Cabrera, Y. (2001). The impact of depressive symptoms on the functional status of inner-city patients with asthma. *Ann Allergy Asthma Immunol*, Vol. 87, pp. 205-210.
- Goldberg, D.P. & Hillier, V.F. (1979). A Scaled Version of the General Health Questionnaire. *Psychological Medicine*, Vol. 9, pp. 139-145.
- Goldstein, D.S. & Dekker, M. (2001). *The autonomic nervous system in health and disease*. Informa Healthcare.
- Gonzalez, S., & Steinglass, P. (2002). Application of Multifamily Groups in Chronic Medical Disorders. In: McFarlane, W. *Multifamily Groups in the Treatment of Severe Psychiatric Disorders*. New York: The Guilford Press.
- Gonzalez, S., Steinglass, P., & Reiss, D. (1986). *Family- centred interventions for the chronically disabled: The 8-session multiple-family group programme: Treatment manual*. Washington, DC: George Washington University Rehabilitation Research and Training Center.
- Goodwin, R.D. & Eaton, W.W. (2003). Asthma and the risk of panic attacks among adults in the community. *Psychological Medicine*, Vol. 33, pp. 879-885.
- Graffar, M. (1956). Une méthode de classification sociale d'échantillons de population. *Courier*, Vol. 6, pp. 455-459.
- Gregerson, M.B. (2000). The curious 2000-year case of asthma. *Psychosom Med*, Vol. 62, pp. 816-827.
- Gustafsson, P.A. & Cederblad, M. (1986). Family therapy in the treatment of severe childhood asthma. *Journal of Psychosomatic Research*, Vol. 30, pp. 369-374.
- Hasler, G., Gergen, P.J., Kleinbaum, D.G. & Ajdacic, V. (2005). Asthma and Panic in Young Adults. A 20-Year Prospective Community Study. *American Journal of Respiratory and Critical Care Medicine*, Vol. 171, pp. 1224-1230.

- Heaney, L.G., Conway, E., Kelly, C. & Gamble, J. (2005). Prevalence of psychiatric morbidity in a difficult asthma population: relationship to asthma outcome. *Respir Med*, Vol. 99, pp. 1152–1159.
- Hibbert, G.A. & Pilsbury, D. (1988). Demonstration and treatment of hyperventilation causing asthma. *Br J Psychiatry*, Vol. 153, pp. 687–9.
- Hollaender, J. & Florin, I. (1983). Expressed emotion and airway conductance in children with bronchial asthma. *Journal of Psychosomatic Research*, Vol. 27, pp. 307–311.
- Hornsveld, H.K. & Garssen, B. (1996). Double-blind placebo-controlled study of the hyperventilation provocation test and the validity of the hyperventilation syndrome. *Lancet*, Vol. 384, pp. 158.
- Horton, D.J., Suda, W.L., Kinsman, R.A., Souhrada, J. & Spector, S.L. (1978). Bronchoconstrictive suggestion in asthma: a role for airways hyperreactivity and emotions. *American Review of Respiratory Disease*, Vol. 117, pp. 1029–1038.
- Innes, N.J., Reid, A., Halstead, J., Watkin, S.W. & Harrison, B.D. (1998). Psychosocial risk factors in near-fatal asthma and in asthma deaths. *J R Coll Physicians Lond*, Vol. 32, pp. 430–434.
- Irvine, L., Crombie, I.K., Clark, R.A., Slane, P.W., Feyerabend, C., Goodman, K.E. & Cater, J.I. (1999). Advising parents of asthmatic children on passive smoking: Randomised controlled trial. *BMJ*, Vol. 318, pp. 1456–1459.
- Isenberg, S.A., Lehrer, P. & Hochron, S.M. (1992). The effects of suggestion and emotional arousal on pulmonary function in asthma: a review and a hypothesis regarding vagal mediation. *Psychosomatic Med*, Vol. 54, pp. 192–216.
- Janoski, M.B.L., Bell, I.R. & Peterson, R. (1994). What connections exist between shyness, hay fever, anxiety, anxiety sensitivity, and panic disorders? *Anxiety Stress Coping*, Vol. 7, pp. 19–34.
- Juniper, E.F., Gujatt, G.H., Cox, F.M., Ferrie, P.J. & King, D.R. (1999a). Mini Asthma Quality of Life. *Eur Respir J*, Vol. 14, pp. 32–38.
- Juniper, E.F., O'Byrne, P.M., Guyatt, G.H., Ferrie, P.J. & King, D.R. (1999b). Development and validation of a questionnaire to measure asthma control. *Eur Respir J*, Vol. 14, pp. 902–907.
- Kang, D.H., Coe, C.L., McCarthy, D.O., Jarjour, N.N., Kelly, E.A., Rodriguez, R.R., Busse, W.W. (1997). Cytokine profiles of stimulated blood lymphocytes in asthmatic and healthy adolescents across the school year. *Journal of Interferon and Cytokine Research*, Vol. 17, pp. 481–487.
- Kelloway, J.S., Wyatt, R., DeMarco, J. & Adlis, S. (2000). Effect of salmeterol on patients adherence to their prescribed refills for inhaled corticosteroids. *Annals of Allergy, Asthma and Immunology*, Vol. 84, pp. 324–328.
- Kinsman, R.A., Dirks, J.F. & Jones, N.F. (1982). Psychomaintenance of chronic physical illness. In: Millon, T. & Green, C.J. *Handbook of clinical Health Psychology*. New York: Plenum, pp. 435–465.
- Kinsman, R.A., Luparello, T., O'Banion, K. & Spector, S. (1973). Multidimensional Analysis of the Subjective Symptomatology of Asthma. *Psychosomatic Medicine*, Vol. 35, No. 3, pp. 250–266.
- Koch, C. & Laurent, G. (1999). Complexity and the nervous system. *Science*, Vol. 284, pp. 96–98.

- Koivumaa-Honkanen, H.T., Honkanen, R., Vinamäki, H., Heikkilä, K., Kaprio, J. & Koskenvuo, M. (2000). Self-reported life satisfaction and 20-year mortality in healthy Finnish adults. *Am J Epidemiol*, Vol. 152, pp. 983-991.
- Kotses, H., Bernstein, I.L., Bernstein, D.I., Reynolds, R.V.C., Korbee, L., Wigal, J.K., Ganson, E., Stout, C. & Creer, T.L. (1995). A self-management program for adult asthma. Part I: Development and evaluation. *Journal of Allergy and Clinical Immunology*, Vol. 95, pp. 529-540.
- Landreville, P. & Veniza, J. (1994). Differences in appraisal and coping between elderly coronary artery disease patients high and low in depressive symptoms. *J Ment Health*, Vol. 3, pp. 79-90.
- Lask, B. & Matthew, D. (1979). Childhood asthma. A controlled trial of family psychotherapy. *Archives of Disease in Childhood*, Vol. 54, pp. 116-119.
- Lavoie KL, Bouthillier D, Bacon SL, Lemièrre, C., Martin, J., Hamid, Q., Ludwig, M., Olivenstein, R. & Ernst, P. (2010). Psychological distress and maladaptive coping styles in patients with severe versus moderate asthma. *Chest*, Vol. 137, No. 6, pp. 1324-31.
- Lavoie, K.L., Bacon, S.L., Barone, S., Cartier, A., Ditto, B. & Labrecque, M. (2006). What is worse for asthma control and quality of life: depressive disorders, anxiety disorders, or both? *Chest*, Vol. 130, pp. 1039-1047.
- Lehrer, P.M. (1998). Emotionally triggered asthma: A review of research literature and some hypotheses for self-regulation therapy. *Applied Psychophysiology and Biofeedback*, Vol. 23, pp. 13-41.
- Lehrer, P.M., Feldman, J., Giardino, N., Song, H.S. & Schamaling, K. (2002). Psychological aspects of asthma. *Journal of Consulting and Clinical Psychology*, Vol. 70, No. 3, pp. 691-711.
- Lehrer, P.M., Generelli, P. & Hochron, S. (1997). The effect of facial and trapezius muscle tension impedance in asthma. *Applied Psychophysiology and Biofeedback*, Vol. 22, pp. 43-54.
- Lehrer, P.M., Isenberg, S. & Hochron, S.M. (1993). Asthma and emotion: a review. *J Asthma*, Vol. 30, pp. 5-21.
- Lehrer, P.M., Vaschillo, E., Vaschillo, B., Lu, S.E., Scardella, A., Siddique, M. & Habib, R.H. (2004). Biofeedback Treatment for Asthma. *Chest*, Vol. 126, pp. 352-361.
- Lehrer, P.M., Vaschillo, E., Vaschillo, B., Lu, S.E., Ekeberg, D.L., Edelberg, R., Shih, W.J., Lin, Y., Kuusela, T.A., Tahvanainen, K.U. & Hamer, R.M. (2003). Heart rate variability biofeedback increases baroreflex gain and peak expiratory flow. *Psychosomatic Medicine*, Vol. 65, pp. 796-805.
- Levenson, R.W. (1979). Effects of thematically relevant and general stressors on specificity of responding in asthmatic subjects. *Psychosom Med*, Vol. 41, pp. 28-39.
- Levitan, H. (1985). Onset of asthma during intense mourning. *Psychosomatics*, Vol. 26, pp. 939-941.
- Levy, S. (1984). Behavior and cancer. In: Light, R.J. & Pilemer, D.B. *Summing up: The science of reviewing research*. Cambridge, MA: Harvard University Press.
- Luparello, T.J., Lyons, H.A., Bleecker, E.R. & McFadden, E.R. (1968). Influences of suggestion on airway reactivity in asthmatic subjects. *Psychosom Med*, Vol. 30, pp. 819-825.

- MacKenzie, J.N. (1986). The production of “rose asthma” by artificial rose. *Am J Med Sci*, Vol. 91, pp. 45-47.
- Manto, P.G. (1969). *An investigation of feedback mechanisms in stress-induced changes of autonomic balance*. Dissertação Académica: Rutgers University.
- Martin, A.J., Campbell, D.A., Gluya, P.A., Coates, J.R., Ruffin, R.E., Roder, D.M., et al. (1995). Characteristics of near-fatal asthma in childhood. *Pediatric Pulmonology*, Vol. 20, pp. 1-8.
- Martins, F. (1995). STAXI. In: Almeida, L., Simões, M. & Gonçalves, M. *Provas Psicológicas em Portugal*. Braga: APPORT.
- Mathinson, D.A. (1993). Asthma in adults: diagnosis and treatment. In: Middleton, E., Rees, C.E., Ellis, E.F., Adkinson, N.F., Yunginger, J.W. & Busse, W.W. (Editors). *Allergy: principles and practice*. Vol 2. (4th ed.), pp. 1263-1300. St Louis (MO): Mosby.
- Mayer-Gross, W., Slater, E. & Roth, M. (1969). *Clinical Psychiatry* (3rd ed.). London: Baillière, Tindall & Cassell.
- McFadden, E.R., Luparello, T., Lyons, H.A. & Bleecker, E. (1969). The mechanism of action of suggestion in the induction of acute asthma attacks. *Psychosom Med*, Vol. 31, pp. 134-143.
- McFarlane, W.R., Link, B., Dushay, R., et al. (1995). Psychoeducational multiple family groups: Four-year relapse outcome in schizophrenia. *Family Process*, Vol. 34, pp. 127-144.
- McQuaid, E.L., Kopel, S.J. & Nassau, J.H. (2001). Behavioral adjustment in children with asthma: A meta-analysis. *J Dev Behav Pediatr*, pp. 430-490.
- Miller, B.D. & Strunk, R.C. (1989). Circumstances surrounding the deaths of children due to asthma. *American Journal of Diseases of Children*, Vol. 143, pp. 1294-1299.
- Miller, B.D. (1987). Depression and asthma: a potentially lethal mixture. *J Allergy Clin Immunol*, Vol. 80, pp. 481-486.
- Miller, D.J. & Kotses, H. (1995). Classical conditioning of total respiratory resistance in humans. *Psychosomatic Medicine*, Vol. 57, pp. 148-153.
- Mrazek, D.A., Schuman, W.B. & Klinnert, M. (1998). Early asthma onset: Risk of emotional and behavioral difficulties. *J Child Psychol Psychiatry*, Vol. 39, No. 2, pp. 247-254.
- Neild, J.E. & Cameron, I.R. (1985). Bronchoconstriction in response to suggestion: its prevention by an inhaled anticholinergic agent. *BMJ*, Vol. 290, pp. 674.
- Nouwen, A., Freeston, M.H., Labbé, R. & Boulet, R.P. (1999). Psychological factors associated with emergency room visits among asthmatic patients. *Behavior Modification*, Vol. 23, pp. 217-233.
- Osowiecki, D.M. & Compas, B.E. (1999). A prospective study of coping, perceived control, and psychological adaptation to breast cancer. *Cogn Ther Res*, Vol. 23, pp. 169-80.
- Picado, C., Montserrat, J.N., de Pablo, J., Plaza, V. & Agustí-Vidal, A. (1989). Predisposing factors to death after recovery from a life-threatening asthmatic attack. *J Asthma*, Vol. 26, No. 4, pp. 231-236.
- Ponciano, E., Vaz Serra, A. & Relvas, J. (1982). Aferição da escala de auto-avaliação de ansiedade, de Zung, numa amostra de população portuguesa – I. – Resultados da aplicação numa amostra de população normal. *Psiquiatria Clínica*, Vol. 3, No. 4, pp. 191-202.

- Ponciano, E., Vaz Serra, A. & Relvas, J. (1982). Aferição da escala de auto-avaliação de ansiedade, de Zung, numa amostra de população portuguesa – I. – Resultados da aplicação numa amostra de população normal. *Psiquiatria Clínica*, Vol. 3, No. 4, pp. 191-202.
- Prueter, C. & Norra, C. (2005). Mood disorders and their treatment in patients with epilepsy. *J Neuropsychiatry Clin Neurosci*, Vol. 17, No. 1, pp. 20-8.
- Put, C., Demedts, M., van den Bergh, O., Demyttenaere, K. & Verleden, G. (1999). Asthma symptoms: influence of personality versus clinical status. *Eur Respir J*, Vol. 13, pp. 751-756.
- Rietveld, S.B.I. & Everaerd, W. (2000). Psychological confounds in medical research: the example of excessive cough in asthma. *Behav Res Ther*, Vol. 38, pp. 791-800.
- Rimington, L.D., Davies, D.H., Lowe, D. & Pearson, M.G. (2001). Relationship between anxiety, depression, and morbidity in adult asthma patients. *Thorax*, Vol. 56, pp. 266-271.
- Rumbak, M.J., Kelso, T.M., Arheart, K.L. & Self, T.H. (1993). Perception of anxiety as a contributing factor of asthma: indigent. *J Asthma*, Vol. 30, pp. 165-169.
- Sandberg, S., Paton, J., Ahola, S., McCann, D.C., McGuinness, D., Hillary, C.R. & Oja, H. (2000). The role of acute and chronic stress in asthma attacks in children. *Lancet*, Vol. 356, No. 9234, pp. 982-7.
- Santavirta, N. (1997). Coping, pain and disability in patients with chronic inflammatory and musculoskeletal diseases. Stockholm: Karolinska Institutet.
- Santos, S.C. & Silva, D.R. (1997). Adaptação do State-Trait Anxiety Inventory (STAI) Form Y para a população portuguesa: Primeiros dados. *Revista Portuguesa de Psicologia*, Vol. 32, pp. 71-89.
- Scharloo, M., Kaptein, A., Weinman, J., Hazes, J.M., Willems, L.N.A. (1998). Illness perceptions, coping and functioning in patients with rheumatoid arthritis, chronic obstructive pulmonary disease and psoriasis. *J Psychosom Res*, Vol. 44, pp. 537-85.
- Scott, K.M., Von Korff, M., Ormel, J., Zhang, M.Y., Bruffaerts, R., Alonso, J., Kessler, R.C., Tachimori, H., Karam, E., Levinson, D., Bromet, E.J., Posada-Villa, J., Gasquet, I., Angermeyer, M.C., Borges, G., de Girolamo, G., Herman, A. & Haro, J.M. (2007) Mental disorders among adults with asthma: results from the World Mental Health Survey. *Gen Hosp Psychiatry*, Mar-Apr, Vol. 29, No. 2, pp. 123-33.
- Silagy, C. (1999). Advising parents of asthmatic children on passive smoking: Randomized controlled trial. *Journal of Paediatrics*, Vol. 135, pp. 650-651.
- Silva, D.R. & Campos, R. (1998). Alguns dados normativos do Inventário de Estado-Traço de Ansiedade Forma Y (STAI) de Spielberger para a população portuguesa. *Revista Portuguesa de Psicologia*, Vol. 33, pp. 71-89.
- Silverglade, I., Tosi, D.J., Wise, P.S., D'Costa, A. (1994). Irrational beliefs and emotionality in adolescents with and without bronchial asthma. *Journal of General Psychology*, Vol. 121, pp.199-207.
- Smith, J.R., Mildenhall, S., Noble, M.J., Shepstone, L., Koutantji, M., Mugford, M. & Harrison, B.D. (2005). The Coping with Asthma Study: a randomised controlled trial of a home based, nurse led psychoeducational intervention for adults at risk of adverse asthma outcomes. *Thorax*, Dec, Vol. 60, No. 12, pp. 1003-11.

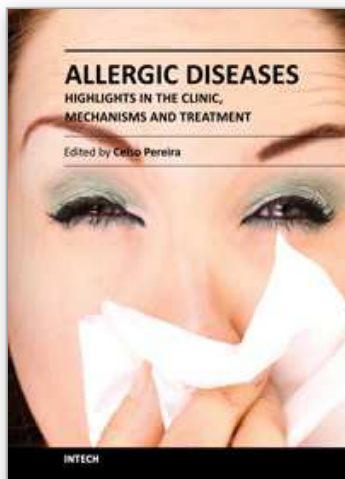
- Smith, J.R., Mugford, M., Holland, R., Noble, M.J. & Harrison, B.D. (2007). Psycho-educational interventions for adults with severe or difficult asthma: a systematic review. *J Asthma*, Apr, Vol. 44, No. 3, pp. 219-41.
- Spielberger, C.D. & London, P. (1990). Blood pressure and injustice. *Psychology Today*, Vol. 1, pp. 48-51.
- Spielberger, C.D. (1983). *Manual for the State-Trait Anxiety Inventory STAI (Form Y) ("Self Evaluation Questionnaire")*. Palo Alto: Consulting Psychologists Press, Inc.
- Spielberger, C.D. (1988). *State-trait Anger Expression Inventory (STAXI)*. Odessa, FL: Psychological Assessment Resources.
- Spinhoven, P., Peski-Oosterbaan, A.S., Van der Dooes, A.J., Willelms, N.J. & Sterk, P.J. (1997). Association of anxiety with perception of induced bronchoconstriction in patients with asthma. *Thorax*, Vol. 52, pp. 152.
- Staudenmayer, H., Kinsman, R., Dirks, J.F., Spector, S.L. & Wangaard, C. (1979). Medical outcome in asthmatic patients: effects of airways hyperreactivity and symptom-focused anxiety. *Psychosomatic Medicine*, Vol. 41, pp. 109-118.
- Steiner, H., Higgs, C.M.B., Fritz, G.K., Laszlo, G. & Harvey, J.E. (1987). Defense Style and the perception of asthma. *Psychosomatic Med*, Vol. 49, pp. 35-44.
- Steinglass, P. (1998). Multiple family discussion groups for patients with chronic medical illness. *Families, Systems and Health*, Vol. 16, pp. 55-70.
- Steinglass, P., Ostroff J., & Steinglass A.S. (2002). *Treatment Manual: The Ackerman/memorial Sloan-Kettering multiple family discussion group for cancer patients and their families*. Washington DC: George Washington University Rehabilitation Research and Training Centre.
- Stout, C.K.H. & Creer, T.L. (1997). Improving perception of air flow obstruction in asthma patients. *Psychosomatic Med*, Vol. 59, pp. 201-206.
- Strunk, R., Mrazek, D.A., Fuhrmann, G.S. & LaBrecque, J.F. (1985). Physiologic and psychological characteristics associated with deaths due to asthma in childhood. *J Am Med Assoc*, Vol. 254, No. 9, pp. 1193-1198.
- Strunk, R.C., Nicklas, R.A., Milgrom, H., Ikle, D. (1999). Fatal and near-fatal asthma questionnaire: prelude to a national registry. *J Allergy Clin Immunol*, Vol. 104, pp. 763-768.
- Suissa, S., Ernest, P., Benayoun, S., Baltzan, M. & Cai, B. (2000). Low-dose inhaled corticosteroids and the prevention of death from asthma. *N Engl J Med*, Vol. 343, pp. 332-336.
- Sullivan, S.D., Elixhauser, A., Buist, S., Luce, B.R., Eisenberg, J. & Weiss, K.B. (1996). National asthma education and prevention program working group report on the cost effectiveness of asthma care. *Am J Respir Care Med*, Vol. 154, pp. 584-595.
- Sun, H.W., Wang, J.P., Wang, S.Z., Wang, Y.Y., Song, Y.P., Yang, Z.H. & Wang, L.X. (2010). Effect of educational and psychological intervention on the quality of life of asthmatic patients. *Respir Care*, Vol. 55, No. 6, pp. 725-8.
- Taitel, M.S., Kotses, H., Bernstein, I.L., Bernstein, D.I. & Creer, T.L. (1995). A self-management program for adult asthma. Part II: Cost-benefit analysis. *Journal of Allergy and Clinical Immunology*, Vol. 95, pp. 672-676.

- ten Brinke, A., Ouwerkerk, M.E., Bel, E.H. & Spinhoven, P. (2001a). Similar psychological characteristics in mild and severe asthma. *Journal of Psychosomatic Research*, Vol. 50, pp. 7-10.
- ten Brinke, A., Ouwerkerk, M.E., Zwinderman, A.H., Spinhoven, P. & Bel, E.H. (2001b). Psychopathology in patients with severe asthma is associated with increased health care utilization. *American Journal of Respiratory & Critical Care Medicine*, Vol. 163, pp. 1093-1096.
- Thomas, M., Bruton, A., Moffat, M. & Cleland, J. (2011). Asthma and psychological dysfunction. *Prim Care Respir J*, Vol. 15.
- Thomas, M., McKinley, R.K., Freeman, E. & Foy, C. (2001). Prevalence of dysfunctional breathing in patients treated for asthma in primary care: cross sectional survey. *BMJ*, Vol. 322, pp. 98-100.
- van den Bergh, O., Stegen, K. & van de Woestijne, K.P. (1997). Learning to have psychosomatic complaints in psychosomatic patients. *Psychosomatic Medicine*, Vol. 59, pp. 13-23.
- Vila, G., Nollet-Clemencon, C., Blic, J., Mouren-Simeoni, M.C. & Scheinmann, P. (2000). Prevalence of DSM IV anxiety and affective disorders in a pediatric population of asthmatic children and adolescents. *J Affect Disord*, Vol. 58, pp. 223-231.
- Wainwright, N.W., Surtees, P.G., Wareham, N.J. & Harrison, B.D. (2007). Psychosocial factors and incident asthma hospital admissions in the EPIC-Norfolk cohort study. *Allergy*, Vol. 62, pp. 554-60.
- Wamboldt, M.Z., & Levin, L.B.A. (1995). Utility of Multifamily Psychoeducational Groups for Medically - III Children and Adolescents. *Family Systems Medicine*, Vol. 13, pp. 151-161.
- Weng, G., Bhalla, U.S. & Iyengar, R. (1999). Complexity in biological signaling systems. *Science*, Vol. 284, pp. 92-96.
- Whitesides, G.M. & Ismagilov, G.M. (1999). Complexity in chemistry. *Science*, Vol. 284, pp. 89-92.
- Wilson, S.R., Latini, D., Starr, N.J., Fish, L., Loes, L.M., Page, A. & Kubic, P. (1996). Education of parents of infants and very young children with asthma: a developmental evaluation of the wee wheezers program. *Journal of Asthma*, Vol. 33, No. 4, pp. 239-254.
- Wöller, W., Kruse, J., Winter, P., Mans, E.J. & Alberti, L. (1993). Cortisone image and emotional support by key figures in patients with bronchial asthma. *Psychotherapy and Psychosomatics*, 59; 190-196.
- Wright, R.J., Rodriguez, M. & Cohen, S. (1998). Review of psychosocial stress and asthma: an integrated biopsychosocial approach. *Thorax*, Vol. 53, pp. 1066-74.
- Yellowlees, P.M. & Kalucy, R.S. (1990). Psychobiological aspects of asthma and the consequent research implications. *Chest*, Vol. 97, pp. 628-634.
- Yellowlees, P.M. & Ruffin, R.E. (1989). Psychological defenses and coping styles in patients following a life-threatening attack of asthma. *Chest*, Vol. 95, pp. 1298-1303.
- Yellowlees, P.M., Haynes, S., Potts, N. & Ruffin, R.E. (1988). Psychiatric morbidity in patients with life-threatening attack of asthma: initial report of a controlled study. *Med J Aust*, Vol. 149, pp. 246-249.

- Yorke, J., Fleming, S.L. & Shuldham, C. (2007). Psychological interventions for adults with asthma: a systematic review. *A Respir Med*, Vol. 101, No. 1, pp. 1-14.
- Zigmond, A.S.S.R. (1983). The hospital anxiety and depression scale. *Acta Psychiatr Scand*, Vol. 67, pp. 361-370.
- Zung, W.W.K. (1971). A rating instrument for anxiety disorders. *Psychosomatics*, Vol. 6, pp. 371-379.

IntechOpen

IntechOpen



Allergic Diseases - Highlights in the Clinic, Mechanisms and Treatment

Edited by Prof. Celso Pereira

ISBN 978-953-51-0227-4

Hard cover, 554 pages

Publisher InTech

Published online 14, March, 2012

Published in print edition March, 2012

The present Edition "Allergic diseases - highlights in the clinic, mechanisms and treatment" aims to present some recent aspects related to one of the most prevalent daily clinical expression disease. The effort of a group of outstanding experts from many countries reflects a set of scientific studies very promising for a better clinical care and also to the treatment and control of the allergy. This book provides a valuable reference text in several topics of the clinical allergy and basic issues related to the immune system response. The inflammatory reaction understanding in allergic disease is clearly evidenced, as well as new strategies for further researches.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Lia Fernandes (2012). Psychological Factors in Asthma and Psychoeducational Interventions, Allergic Diseases - Highlights in the Clinic, Mechanisms and Treatment, Prof. Celso Pereira (Ed.), ISBN: 978-953-51-0227-4, InTech, Available from: <http://www.intechopen.com/books/allergic-diseases-highlights-in-the-clinic-mechanisms-and-treatment/psychological-factors-in-asthma-and-psychoeducational-interventions>

INTech
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

© 2012 The Author(s). Licensee IntechOpen. This is an open access article distributed under the terms of the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

IntechOpen

IntechOpen