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Presence of depression in patients with asthma and its influence on their families

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In this article we examine and review investigations that study the possible presence of depression among patients suffering from bronchial asthma. Throughout the article we provide possible explanations about the relationship between bronchial asthma and depression found in psychological literature along with their possible repercussions in the evolution, morbidity control, and treatment of the illness. Likewise, studies that have investigated depression in families of teenagers and children with bronchial asthma are reviewed. In order to do that, the investigations have been extracted from some of the most widely used databases in Psychology concerning this topic (Web of Knowledge, EBSCO, Psycodoc, Cindoc, Psycarticles and Google Scholar). Finally we offer some reflections about the data analyzed, in the sense that there is enough empirical evidence to confirm that the rates of depression among asthmatic patients and their families are significantly larger than among their asthma-free peers.
Keywords: *Asthma, depression, emotion, family.*

Presencia de la depresión en pacientes con asma y su influencia en sus familias

En el presente artículo se examinan y revisan las investigaciones que estudian la posible presencia de la depresión en los pacientes con asma bronquial. A lo largo del artículo se proporcionan las posibles vías de explicación de la relación entre asma bronquial y la depresión encontradas en la literatura, con sus posibles repercusiones en la evolución, morbilidad, control y tratamiento de la enfermedad. De igual forma, se revisan los estudios que han investigado la

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depresión en las familias de los niños y adolescentes con asma bronquial. Para tal fin, las investigaciones han sido extraídas de algunas de las bases de datos más utilizadas en Psicología sobre dicha temática (Web of Knowledge, EBSCO, Psycodoc, Cindoc, Psycarticles and Google Scholar). Finalmente se ofrecen algunas reflexiones sobre los datos analizados, en el sentido de que existen pruebas empíricas suficientes para afirmar que los índices de depresión entre los enfermos asmáticos y sus familias es significativamente mayor que entre sus iguales libres de asma.

Palabras clave: *asma, depresión, emoción, familia.*

Bronchial asthma is, without a doubt, a typical disease of mankind. In fact, it was already described by Hippocrates in the 4th Century before Christ. Despite how long it has been, specialists have not been able to agree on the definition of the disease and its main characteristics. The reasons for this are that asthma symptoms can occur in other diseases and its etiopathogenesis has not been completely clarified yet, which makes it very difficult to classify. Even the diagnostic criteria are of different nature and not unanimously shared.

We can define asthma as an obstructive and reversible lung disorder, defined by a hyper-responsiveness of the respiratory tract to a range of stimuli. More specifically, Cisneros, López, Ramírez and Almonacid (2009) define asthma as a disease originated by the presence of a chronic inflammation of the respiratory tract, associated to bronchial hyper-responsiveness, and its course typically includes reversible bronchial obstruction episodes, with or without treatment.

At a physiological level, asthma is mainly an inflammatory disorder. This was proved by two different studies performed on human beings (Serafin, 1996). The first one is related to the bronchoalveolar lavage of asthma patients, where a greater amount of inflammatory cells were found, including eosinophils, macrophages and lymphocytes, as compared to healthy individuals. The second study analyzes lung biopsies performed on healthy and asthmatic individuals; those carried out on asthma sufferers showed a greater thickness of the respiratory tract and a higher inflow of inflammatory cells towards the lung tissues.

Bronchial asthma, to a larger or smaller extent, is present in all countries, regardless of the development stage reached, although 80% of deaths due to asthma occur in countries with medium or low income. According to the World Health Organization (WHO), there are at least 235 million patients with asthma, 255,000 of which died because of this disease in 2005 (WHO, 2013).

Different studies show that in industrialized countries, asthma prevalence increases approximately 5% every year, both in children and young adults, although this prevalence increase could also be due to a higher diagnosis and a better classification of asthma-suffering patients (Urrutia et al. 2012), while it is also important to know the social context in which the disease develops. Generally speaking, asthma prevalence figures are about 5% amongst the general population and about 8-10% amongst children (Carlsson et al., 2013). A greater number of

hospital admissions and exacerbations were found in women than in men, which suggests depression as a possible factor causing asthma (Melero et al., 2012).

Physiologically, both depression and asthma are related to changes in the cholinergic system. A depressive state can be characterized by a predominance of the parasympathetic nervous system in a way that any circumstance involving a cholinergic dominance (the parasympathetic nervous system plays an essential role in regulating bronchial tone) places the patients in a very high-risk situation, as they tend to show a higher parasympathetic reactivity in the respiratory tract (Suárez, Huerta & del Olmo, 2010). McFadenn, Luparello, Lyons and Bleecker (1969) highlighted the cholinergic intervention when blocking the bronchoconstriction response in a suggestion experiment with prior atropine (anticholinergic) administration. In this type of experiment, the induced suggestions refer to the bronchoconstrictor effect caused by the substance being administered to the subjects, thus increasing the asthma symptoms. In the McFadenn et al. (1969) experiment, the atropine prevented the suggestion effect. More recently, it was pointed out that the P substance (involved in pain perception) could be linked to the physiopathology of the inflammatory disease, as well as to that of anxiety and depression (Rosenkranz, 2007).

Similarly, it was found that administering long-term corticoid treatments reduces the serotonin levels in the blood and this could explain the onset of depressive symptoms (Vidal & Matamala, 2013). This matter is coherent with the psychological anguish observed in patients with severe asthma and prednisone-dependants, as compared to those who did not show such dependence.

Bronchial asthma can become a very important problem in the life of patients suffering from this disease, often reaching the point where it causes severe limitations to their lifestyles (Fernández-Rodríguez, 2012a). This situation is particularly important amongst the child population, as the restrictions can occasionally cause deficiencies, both academically and socially, with the serious consequences that this may imply for children and for the patients' future development. There is enough literature about the influence of depression on those deficiencies (Galicia, Sánchez & Robles, 2009, 2013).

Nowadays there is a vast amount of data explaining or detailing the relationship that the psychological factors have with asthma (Fernández-Rodríguez, 2012b; Cano & Fernández-Rodríguez, 1999; Cano, Fernández-Rodríguez & Spielberger, 2012; Fernández-Rodríguez & González, 2013). There is enough evidence to state that psychosocial factors play a key role in the physical disease variability, evolution, morbidity, and treatment, with the psychological treatment being particularly relevant for an integral handling of the disease (Ritz, Meuret, Trueba, Fritzsche & Von Leupoldt, 2013).

Depression in asthma patients can cause a worsening of respiratory symptoms and an increase of the disease exacerbations (Ahmedani, Peterson, Wells & Williams, 2013). At the same time, asthma can facilitate a depressive reaction.

Indeed, a depressive state may trigger in the patient a minimization of his/her asthma symptoms perception, so there would be poor self-care regarding the disease, thus resulting in poor control and a low index of adherence to medication (Krauskopf et al., 2013). According to Kumar, Misra, Kundu, Ghoshal and Majumdar (2013), there is no significant correlation between asthma severity and depression severity, which entails that there is no correlation between asthma control and depression severity.

On the contrary, the unpredictability of an asthma attack taking place may generate a lack of control over the situation for the individual, and this lack of control may be related to depression, according to the Learned Helplessness Theory, although this hypothesis has not been experimentally demonstrated (Fernández-Rodríguez, 2012a).

Objectives

The aim of this article is to provide evidence about the possible relationship and presence of depression in asthmatic patients and to study its possible influence on the families of the patients in their relationship with them.

Method

Materials

All the documents found in the databases mentioned below have been used, following the guidelines also mentioned.

Type of study

The present study maintains an interpretative nature of the data obtained.

Procedure

A bibliographic search was performed in several databases, more specifically: Web of Knowledge, Psicodoc, Cindoc, Dialnet, Psycarticles, Ebsco, and Google Scholar. The following descriptors were used: *bronchial asthma*, and *depression*, as well as their Spanish equivalents. The bibliographic search was done in May 2014 (including references from 1960), and no limitations were set regarding the period of time checked. The results only included studies analyzing asthma, whereas those related to other chronic diseases, such as rhinitis, often

associated to bronchial asthma (Fernández-Rodríguez & Herrera, 2013), as well as immunological diseases, were left out.

Analysis of the information

The articles selected appear chronologically: first of all, we describe the line of research referring to the study of the presence of depression in asthmatic patients. Then, the investigations referring to the relationship between the asthmatic patient and his family are described, also chronologically.

Results

A considerable number of studies have tried to prove the presence of depression in asthma patients, comparing them to a sample of healthy subjects. The data found show that, in general terms, there is a higher presence of depression in asthma sufferers than in individuals without the disease. Since Purcell (1963), the relationship between asthma and depression has been proved. This author already indicated that a negative affect is an important exacerbator of asthma symptoms.

Depression appears frequently in cases of bronchial asthma and the prevalence in pediatric asthma patients is 5-15%, although depression symptoms have been diagnosed in up to 50% of asthma patients, a frequency much higher than that of the healthy population. The prevalence of depression amongst teenagers is 16.3%, compared to the 8.6% amongst those not suffering from asthma (Suárez et al., 2010).

Lyketsos (1984) compared a group of adult asthma patients to a control group comprising healthy individuals, with a balanced composition per age. The study verified the existence of higher levels of depression in the asthma patients than in the healthy individuals of the control group. Similarly, Nelms (1989) found higher depression levels in a sample of asthmatic children than in a sample of healthy ones, as well as a higher level of somatic complaints from the sick children.

Bell, Jasnoski, Kagan and King (1991) used a non-clinical sample of 379 university students to study the relationship between depression and allergic disorders (asthma amongst them). These authors assessed depression, fatigue, fear, and allergic disorders with a self-report and they found that 71% of subjects who could be diagnosed with depression had a long history of allergies. In addition, the participants with a higher rate of depression showed the highest prevalence rate of bronchial asthma. Subjects without any allergies did not show higher depression rates in the self-assessment.

Silverglade, Tosi, Wise and D'Costa (1994) –in a research carried out on 129 asthmatic children and teenagers (between 12 and 18 years old) and 74 healthy

participants– found high depression levels in the sample of asthma patients, where depression was often associated to the severity of their asthma, considering that there was a larger presence of depression in moderate to severe asthma sufferers and no difference between mild sufferers and healthy individuals.

Belloch et al. (1994) –with a sample of 51 adult patients (between 18 and 71 years old)– found a higher rate of depressive personality prevalence in female asthma patients than in male ones. The depressive personality trait was very closely linked to an unsettled pulmonary capacity. The same team mentioned in the previous research (Paredes, 1992; Pascual, Belloch & Perpiñá, 1995; cited by Pascual, 1995) found that people with a higher depression score would get worse results in the FEV-1 measurement. A negative effect of depression on asthma was also found. The authors divided the sample according to the depression scores obtained by the different individuals and analyzed the differences between the two groups with regards to asthma severity and quality of life. They found that those patients with a higher level of depression had lower quality of life and would visit the hospital much more often, either for emergencies or admissions.

Nue, Mazzotti, Villarán and Cáceres (2001) analyzed –by means of an evaluation interview– two samples of adult asthma patients: the first one comprising 40 individuals with moderate to severe asthma, and the second a control sample of 40 subjects with mild or intermittent asthma. They noted that 17.5% of the patients with severe asthma showed a more important depressive disorder, whereas only 7.5% was observed in the control sample. The size of the sample used was not sufficient to establish a statistically significant link between the depression and asthma severity variables.

Remington, Davies, Lowe and Pearson (2001) examined the relationship between asthma symptoms, the disease severity and the psychological state of patients being treated in primary care. The study was carried out on a sample of 114 asthma patients and they were evaluated with a questionnaire on quality of life. The levels of anxiety and depression were also measured, and spirometric measures were taken too. The authors found higher depression levels in 10% of the patients, although they did not perform an analysis considering asthma severity.

A hundred and twenty individuals took part in the study by Espinosa et al. (2001): 60 had been diagnosed with bronchial asthma and were 34 years old on average; and 60 were healthy individuals of 31 years of age on average. The depression frequency amongst the group of asthma sufferers was 12% versus 3% amongst the group of healthy people, which meant that the correlation between asthma severity and depression was statistically significant.

Fernández-Rodríguez (2003) obtained statistically significant differences regarding greater depression symptoms in the group of asthmatic patients using two samples, one with 63 asthma patients from outpatient hospital services and another with 65 healthy individuals, with the same composition in terms of age and gender.

Goodwin, Fergusson and Horwood (2004) –in a longitudinal study and with a sample of 1,000 young individuals aged up to 21 years– found that there was a higher probability of depression in this disease.

This study shows that asthma is not significantly related to major depression by using regression statistical adjustments. It was suggested that exposure to adversity in childhood or family factors can partly explain the asthma and depressive disorders co-morbidity.

Otten, Van de Ven, Engels and Van den Eijnden (2009) carried out a prospective study aiming to compare the link between depressive feelings and smoking habits in teenagers with and without asthma. A total of 5,398 teenagers participated in the research during a period of 24 months. The logistic regression analysis showed that depressive feelings and addiction to tobacco were related both transversally and longitudinally. The smoking behavior was similar amongst teenagers with and without asthma, as well as the correlation with depressive feelings. However, participants suffering from asthma were more likely to report depressive feelings than those without asthma and this might imply an indirect relationship between asthma and the smoking behavior.

Di Marco et al. (2010) studied the correlation with the patient characteristics, including anxiety, depression and asthma control level. They used a sample of 315 hospital patients. The authors found a positive correlation between asthma and depression, especially in those cases where the disease was unsatisfactorily controlled, and this was associated to a more frequent use of hospital assistance.

Pietras et al. (2011) used a sample of 167 asthma patients (24 with mild asthma, 76 with moderate asthma, and 67 with severe asthma) and 178 healthy individuals. Amongst the asthma patients, 103 presented a deficient control of the disease, 60 partially controlled it, and only 4 controlled asthma well. The authors found a significantly higher presence of depression in the asthma group, and they correlated this to asthma severity.

Kotrotsiou et al. (2011) worked with a sample of 1,148 students from different schools, with ages ranging between 18 and 25 years (31.1 % of the participants were male and 68.9 % female) –the average age was 18.9. In the sample studied, they found a 9.3% of asthma sufferers and the scores on depression for these participants were considerably higher than those for the students without asthma.

Lu et al. (2012) –using a meta-analysis on asthma teenagers– found that the risk of developing depression was significantly higher amongst teenagers with asthma when compared to the control subjects: the global prevalence of depression symptoms was significantly higher amongst 3,546 asthma teenagers than that of the 24,884 control individuals. The authors highlighted that the proportion of Caucasians and smoking habits were significant factors that explained the risk of developing depression symptoms amongst teenagers with asthma versus the control individuals, whilst age, gender and asthma severity were not significant.

Bazán, Almeida, Osorio and Huitrón (2013) tried to assess the relationship between quality of life and depression in 300 children with asthma between the ages of 7 and 15. The results showed that asthma had an impact on the children's quality of life, showing greater damage in activity limitation. The participants showed higher levels of depression related to gender, as girls displayed a more acute perception of depression symptoms, lower self-esteem, and more interpersonal problems than boys. The results were similar to those found by Urrutia et al. (2012), who –with a sample of 354 asthma patients– found depression to be one of the factors lowering the quality of life of these individuals.

Brunner, Schreiner, Sood and Jacobs (2014) assessed –in a wide longitudinal study– the relationship between prevalent severe depression symptoms and bronchial asthma for a group of young adults and middle-aged individuals (3,614 healthy participants with high depression scores and 3,016 asthma participants with low depression scores. All of them were monitored for a period of 20 years). This observational longitudinal study indicates that depression can be a marker of asthma incidence risk in adults. On the other hand, asthma prevalence is not associated to initial depression incidence in adults.

Fernández-Rodríguez and Miralles (2014) –in a sample of 129 individuals, 63 with asthma and 66 healthy– found a higher depression rate in the asthma patients. Depression was measured with a questionnaire that evaluates such feelings using the triple human response system and also provides a general measurement of depression.

Another important line of research considered focused on studying asthma patients in the context of their family. As it could be expected, these studies focused on children and teenagers suffering from asthma. In general, they assessed how the physical disease could affect families and how impairment in the family might affect the patient. Mothers of children with chronic diseases, such as asthma, showed higher rates of depression than those of children without chronic diseases. Maternal depression may have a negative impact on the child's growth, development and behavior, as well as on mental health, security, and use of health services. Studies show that maternal depression has the potential to increase asthma morbidity and the use of health services. In addition, mothers with depression symptoms display a low efficacy to look after children with asthma, which affects their ability to control their child's asthma and adherence to the prescribed medication (Pak & Allen, 2012).

Mrazek and Klinnert (1992) identified a relationship between the family's psychological health and the asthma of their children. They located 150 children born in families with at least one asthma patient and studied the aspects of family functioning and the risk of suffering from asthma. The risk factors were the following: significant marital problems, mother's persistent depression, parents' problems related to the baby's daily care and later cares of the child. After a 3-year monitoring period, they found that –with the presence of one factor– there was a 17% risk of suffering from asthma. With two or more factors, the risk increased to 42%.

Lozano and Blanco (1996) worked with 55 children between 8 and 12 years of age, a second group of 32 parents and a third group of 87 healthy individuals. They obtained a higher depression index in the group of the patients' parents.

Wamboldt, Weintraub, Krafchick and Wamboldt (1996) –in a sample of parents (in most cases the study refers to mothers) of 62 teenagers– found a greater presence of depression than in groups of parents with healthy teenagers. The results of this study support the existence of a relationship between severe asthma and family affective disorders.

Puura et al. (1998) –in a study with 5,682 prepubescent children, their parents and teachers– noted that the asthmatic children showed high depression indexes, and the teachers observed behaviors such as poor school development, irresponsibility, absenteeism, etc. The parents observed disobedience, lack of attention, social isolation and depressive mood. The results also indicated that a large number of children with multiple depression symptoms did not have a psychological diagnosis and the necessary help.

Shalowitz, Berry, Quinn and Wolf (2001) –with 123 mothers and their asthmatic children (between 18 months and 12 years)– reported that there was a higher presence of depression symptoms in the parents and a worse care of their children's disease. Children were more likely to have higher morbidity if they had cares with depression symptoms and there was also higher morbidity amongst women.

Bartlett, Kolodner, Butz, Eggleston, Malveaux, and Rand (2001) –with data obtained from 338 children and 177 mothers over a period of six months– found that depression symptoms in mothers help predict (30% more likely) possible visits to the emergency room with their children.

Hassanzadeh, Akcakaya, Camcioglu, Cokugras and Aydogan (2003) compared 37 children with mild asthma, 55 with moderate asthma and 8 with severe asthma to 50 healthy children. They not only observed depression scores significantly higher in children with moderate and severe asthma, but they also noticed that depression, along with other feelings, had an impact on the mothers' mood.

Bartlett et al. (2004) –with 158 mothers and over a period of 6 months– verified that the depression symptoms in the mother were not associated with asthma morbidity, but there was a link to other factors such as adherence to treatment and poor management of the disease (such as self-efficacy managing the fit).

Jungha, Wood and Miller (2008) used a sample of 242 children aged between 7 and 17 years, and found a link between the depression in mothers and the severity of the children's diseases, so the maternal depression was related to the psychological dysfunction of their children.

The authors suggest that the diagnosis and treatment of depression in mothers of children with asthma would improve the well-being of the children, both psychologically and physically.

Leão et al. (2009) –in a transversal study including 80 mothers of children with asthma and 160 mothers of children attending hospital pediatric services–

obtained a higher depression prevalence in mothers of children with severe asthma than those of children with intermittent asthma. In this study, no significant relation was found between the duration of children asthma and the mother's depression.

Schreier and Chen (2010) showed how family behaviors regarding the disease can affect the asthma patients' biological markers, highly likely through the influence in the use of medication. Family routines were assessed with questionnaires provided for parents, and biological markers through peripheral blood samples taken every 6 months during the whole study period: a total of 18 months.
Jungha, Wood, Miller and Simmens (2011) with 106 children (between 7 and 17 years old) checked the link between the parents' depression symptoms and their children's disease.

Discussion and conclusions

Not much research exists on the psychological aspects of asthma and depression, and the existing works are not often very clear. As a result, there are only a few samples and they include a mixture of different types of patients in different research projects (as it is frequent to carry out research in allergic patients), rhinitis, asthma, chronic obstructions, etc. Most investigations have a correlational character and they do not show whether the differences found are statistically significant. The majority of studies focus on children.

There are no studies referring to basic psychological research and no studies can be found on psychological processes of a basic nature, such as the classical or operative conditioning. All these facts mean that the conclusions for many of the studies have to be considered cautiously.

In view of the studies considered, we can claim that there is enough empiric evidence to confirm that the depression indexes amongst asthma patients are significantly higher than those amongst healthy individuals.

Similarly, we can conclude that higher depression prevalence amongst parents with children suffering from asthma is well documented. Despite the amount of information considered, it is not possible to clearly identify the direction of the influence between asthma and depression.

The relationship between asthma and depression can be included in the so called 'Theory of the psychological psychomaintenance' (Kinsman, Dirk & Jones, 1982). This theory states that the psychological, social and behavioral variables can maintain and worsen the physical illness, thus having a decisive influence on its course.

Therefore, it is necessary to consider this co-morbidity in the asthma patient, both for diagnosis and treatment. At a diagnostic level, it is necessary to implement tests and controls that take this emotional disorder into account. In order to

design an adequate and complete treatment of asthma, it is necessary to consider the presence of a depression component, including psychological intervention strategies that must include not only adult patients, but also children and teenagers, as well as their parents.

With the addition of new diagnosis and therapy strategies, we will be able to have a positive impact on the disease development; therefore we will be able to increase the patient's quality of life by reducing asthma symptoms, reducing the visits to the emergency room, achieving a better and higher adherence to the treatment, reducing the potential morbidity of the disease, increasing prevention and reducing the financial costs associated to the disease, both for the patient and for the health system.

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