International Journal of Pharmacy and Chemistry
2021; 7(6): 118-121
http://www.sciencepublishinggroup.com/j/ijpc
doi: 10.11648/j.ijpc.20210706.12
ISSN: 2575-5730 (Print); ISSN: 2575-5749 (Online)

Importance of Psychosocial Factors in Evaluating the Degree of Bronchial Asthma and for Purposeful Pharmacotherapy

Jana Krynsky

General Health Insurance Company of Czech Republic, Prague, Czech Republic

Email address:
jana.krynska@vzp.cz

To cite this article:
Jana Krynsky. Importance of Psychosocial Factors in Evaluating the Degree of Bronchial Asthma and for Purposeful Pharmacotherapy. *International Journal of Pharmacy and Chemistry*. Vol. 7, No. 6, 2021, pp. 118-121. doi: 10.11648/j.ijpc.20210706.12

Received: December 29, 2020; **Accepted**: January 16, 2021; **Published**: December 29, 2021

Abstract: The presented case is based on the work of auditing doctor of health insurance company based on data from general practitioners and specialist in pneumology asking for payment an expensive medication. The role of supervision is to access the necessity and justification of costly treatment or to draw the attention of physicians to critical situations of the client and their appropriate solution not only focusing on pharmacology. Monitoring lifelong treatment revealed several key points to significantly affect health that were not properly treated, and this led to disability and, more recently, high treatment costs at later date. The patient's main critical situations have been linked to stress and anxiety but apart from the isolated intervention of a general practitioner, this fact was no considered, not even by specialists. Bronchial asthma is an inflammatory process, and it is known that psychosocial factors play important role as initiators and modifying factors. Their action may affect measurable values of the disease, self-monitoring of the symptoms and adherence for therapy. Not only the pharmacotherapy, but psychological care and strengthening mental health also plays an important role to improve patient well-being. The patient should be viewed in a complex way and early appropriate intervention in risk factors may prevent loss of working potential and economic loss in costly medication.

Keywords: Bronchial Asthma, Eosinophilia, Stress Factors, Depression, Anxiety, Work Ability, Corticosteroids, Mepolizumab

1. Introduction

Bronchial asthma is a heterogeneous disease based on chronic airway inflammation with bronchial hyperreactivity and variable obstruction, which, however, over time raises into bronchial remodeling and then could be irreversible. The main pathogenetic factor is inflammation; mediators of inflammation or its manifestations we can be measured in serum, induced sputum, exhaled air, in bronchoalveolar lavage fluid as well as in the biopsy material of the respiratory tract.

It is advisable to use a complex view of patient to individualize the treatment for asthma assessing the presence of eosinophilia and allergies and determine the phenotype of asthma. Allergological examinations are performed by default, emphasis on examination eosinophils are given by their ability to produce a number of mediators of inflammation and toxic cationic proteins that are significant under pathological circumstances involved in lung tissue damage and remodeling airways and are associated with the development of their hypersensitivity.

In practice, it is not necessary to measure the number of eosinophils in sputum or bronchial mucosa, good orientation provides a differential blood count. The absolute value of eosinophils in peripheral blood (normal is up to 0.5 x 10^9/l, values 0.5–1.5 x 10^9/l are considered to be slightly increased, 1.5–5.0 x 10^9/l for moderate and higher than 5.0 x 10^9/l for severe). [1]

Eosinophilia in bronchial asthma is secondary, mostly low, on average around 0.8 x 10^9/l. If exceeds 1.5 x 10^9/l, must be excluded vasculitis or bronchopulmonary aspergillosis.

It is advisable to have the eosinophil cationic examined protein (ECP) in serum - normal value is up to 15 µg/l. The concentration of nitric oxide in exhaled air (FENO) in

asthmatics correlates with activity eosinophilic inflammation, is reported in ppb values (parts per billion), for elevated values in adults' values of 35–45 ppb is considered. Although examination FENO is not pathognomic for asthma, in patients with a higher value a good clinical one can be expected response to corticosteroid treatment. We currently distinguish 3 phenotypes of asthma bronchial:

1. eosinophilic, allergic - typical "atopic process", thus diseases of various organs, mostly since childhood;
2. eosinophilic, non-allergic - allergological examination is negative or the allergen is not more clinical meaning, beginning in middle age;
3. non-eosinophilic, non-allergic - not clinically significant allergy, it is in obese, comorbidities – there is bronchial hyperreactivity and typical symptoms of asthma.

Simultaneously with the phenotype, the severity of asthma is assessed, which is derived from the minimum degree of pharmacotherapy, necessary to achieve full control, ie asymptomatic, as it is necessary to keep in mind that the diagnosis of asthma is lifelong, the disease is only under full or partial control. Criteria asthma controls are recommended by professional societies allergology and pneumology and are clearly defined, as well as criteria difficult or difficult treatable asthma; I refer to these documents [2-4].

In the recommendations of a professional society we find that a key diagnostic tool is the anamnesis, and if it is consistent, it is highly likely to find out both the disease itself and its probable causes, complicating factors and the level of the disease. We'll find it there also repeated statements about the need for education of patients, but only a very marginal mention of "eventual psychological care", although asthma being long-term considered a mental illness and the psychic patient's condition plays an important role.

Recognition that emotional stress can cause acute or exacerbating chronic asthma has been known for years. Psychological barriers such as misjudgment of symptoms, acceptance or rejection of the disease and low self-esteem may adversely affect treatment cooperation. [5, 6]

Conversely, the presence of chronic and potentially life-threatening illness can cause such stress that more sensitive patients develop anxiety or depressive disorder. Mental stress can affect the body's ability to act effectively with oxidative stress. Research studies confirm that asthma and severe depressive situations cause similar dysregulations key biological systems such as neuroendocrine response to stress affect production of cytokines and neuropeptides. [7] Presence of atopy increases the prevalence of depression - compared to the general populations have patients with depression or other Changes mood increased risk of developing immunologically (IgE) mediated allergic predispositions, including asthma and vice versa - asthmatics are more prone to depression. Patients in the antidepressant treatment needed less for oral corticosteroids and there was a correlation between symptoms severe asthma and depression. Assumed, that chronic psychosocial stress can induce corticoid resistance and partially violate glucocorticoid resistance receptors. [8]

Research shows that about a third of asthmatics children and in 20% of adult asthmatics it is comorbidity anxiety, which is not recognized in routine clinical practice nor adequately treated. [9] Asthma can be preceded by a predispose to the development of anxiety and mood disorders, however also the presence of psychological and behavioral problems can be prevented or predisposed asthma. The key link between asthma and the mood disorder appears to be systemic inflammation and the role of cytokines in CNS neurotransmission is thought.

Peripheral cytokines increase the release of cytokines from glial cells in the brain via the vagus and glossopharyngeal nerves and the role of influencing the hypothalamus-hypophyseal system. Central cognitive processes can affect not only interpretation asthmatic symptoms, but also manifestations and measurable immune and physiological changes functions. [7]

The fundamental approach of the attending physician is visible the patient as a personality, a whole, not just typical manifestations of a particular disease and the resulting laboratory values. Depression and anxiety by patients with bronchial asthma are common and cause negative the course of the disease in vulnerable individuals, which is also evidenced by the following case study.

2. Method

Retrospective evaluation of the course of bronchial asthma according to the doctor's documentation and the database of care taken paid by the health insurance company.

Case Study

In May 2016, we were asked for payments biological medicinal product Nucala, which is mepolizumab, for a 44-year-old woman (born 1972) diagnosed with bronchial asthma. The estimated cost of treatment was 40,747 CZK (1 563€) monthly, but for reimbursement from health insurance was necessary special permission. By the law it can be it covered by public insurance due to health considers the patient's condition to be the only possible one.

Case History

The woman is divorced, has 2 adolescents kids, works in the office as a manager. The job is described as stressful. Her father died in 2011 after 2 years treatment for generalized melanoma, found in 67 age years. She is non-smoker, alcohol drinks "occasionally". She is allergic to all penicillin antibiotics. In medical history she underwent in year 1976 nasal adenectomy, 1986 hospitalized for infectious mononucleosis, 1991 endoscopy stomach with a negative finding, 1992 examined for suspected isthmic goiter, not confirmed. BMI 18, TK in normal. Lung problems - cough with subsequent shortness of breath in day and night since 2/2013, when she worked in an air conditioned room - was diagnosed as bronchial asthma and fixed combination therapy IKS + LABA was initiated. The disease was not sufficiently under control, very simile due high symptomatology and stress she lost about 10 kg/2 months. Within the overall examination revealed a focal lung finding,

in 5/2014 hospitalized for 9 days for suspected pulmonary TB. This diagnosis was not confirmed, and with antituberculotic medicine was not treated. For persistent asthma symptomatology and relatively severe obstructive ventilation disorder added oral corticosteroids, in case of exacerbation in impact. This treatment was difficult for the client to tolerate (problems from gastrointestinal parties not specified) and in 12/2014 she was 2nd degree disability granted.

Lab Tests

Examination in a center for difficult-to-treat asthma in 3/2016 indicates significant exertional dyspnea, nocturnal shortness of breath occasionally and morning shortness of breath regularly. Spirometry FEV1 1.55 l=46.7% normal (N), FEV/IVC 49%, IVC 80% N, MMEF 13% N - moderate obstructive ventilation disorder with good VC, bronchodilator test negative. FENO 49 ppb (slightly increased), peripheral blood eosinophilia: WBC 7.7 x 10^9/l, diff. eosinophils (Eo) 1.6 x 10^9/l, Eo% 21.4, slightly increased also basophils (0.10 x 10^9/l) and monocytes (0.7 x 10^9/l), lymphocytes were in normal count.

Insurance Company Data

According to the information system of the insurance company, diagnoses include cough (R05), hereinafter M546 (pain in the thoracis spine), since 2013 also J45.0 asthma mostly allergic, only 2 times - in 5/2013 and 4/2017 as J 45.1 non-allergic. And specialized care expertise pneumologist was insured treated 2 times in 2013, 7 times in 2014, then 4 times at regular intervals in 2015 and 2016.

On closer examination of diagnoses in the information system, it was found that general practitioner in year 2011 diagnosed anxiety disorder (F41.9), without medication or non-pharmacological specialized care, and in 2014 on the basis of its regulation 2 packs of Neurol (alprazolam) are drawn, probably in context with skin examination for dg D22.5 – melanocyte torso nevus. Weight loss and acceleration problems certainly in embarrassment around the suspicion of tuberculosis and oncology diseases in 5/2014, led to worsening asthmatic problems, including laboratory manifestations discomfort of the whole organism. She has a history of clear psychological burden at work, condition matured up to a disability pension. Psychiatric or psychological examination or treatment reported for reimbursement it was not. Additionally, verified to the death of the father from melanoma occurred in 2011 and in the presence of similar cutaneous lesion in 2014, the client completely compensated.

3. Biological Treatment – Mepolizumab

Eosinophilic granulocytes originate in bone marrow. In healthy individuals, they circulate in small amounts in peripheral blood and peripheral tissue practically do not infiltrate, infiltration occurs due to activation Th2 cellular responses with characteristic induction cytokine spectrum of interleukins IL-4, IL-5, IL-13 [10, 11].

Dominant role for the action of eosinophils and their migration to the airways has IL-5, and so it has become (with its receptor) the target of biologic therapies targeting eosinophilic asthma phenotype.

Therapeutic agent Nucala - mepolizumab (R03DX09) is product of company GlaxoSmithKline Trading Services Limited, Ireland, was registered on 2 December 2015 via EU Community. It is a humanized monoclonal antibody targeting interleukin 5 (IL-5). IL-5 is responsible for the maturation, activation and release of eosinophils from the bone marrow to the bloodstream and affects their survival. Mepolizumab blocks IL-5 binding to its receptors on the surface of the eosinophilic cell, and thus reduces its biological activity and subsequent tissue organ damage. [12, 13]

3.1. Mepolizumab for Severe Eosinophilic Asthma

The DREAM/MENSA registration studies included patients aged ≥ 12 years who were 2 or older with exacerbations in the last 12 months at higher doses oral corticosteroids (equivalent to> 5 mg Prednisone) and the full spectrum of other drugs anti-asthmatic treatment, which included long-term beta2 adrenergic agonists (LABAs), long-term muscarinic antagonists (LAMA), theophylline, oral corticosteroids and antileukotrienes. The FEV1 value was below 90% N, absolute Eo account in peripheral blood ≥ 1.5 x 10^9/l, ie 150 b/µl at the beginning of treatment, or 300 eosinophils/µl or more during the last 12 months. When evaluated after the 36th week a significant decrease in the frequency of exacerbations and the dose could be reduced in almost half of the patient's corticosteroids by about 50%, which is essential to reduce risks of their side effects. Although FEV1 is not a clear indicator of bronchial obstruction was found its average increase over 98 ml and is improved quality of life of asthmatics has also been reported.

3.2. Recommended Use

According to the guidelines is Nucala indicated for severe refractory eosinophilic asthma to long-term administration at a dose of 100 mg/4week subcutaneously. The company's proposal for SÚKL (state institute for drug control) is set as an indication for payment severe refractory asthma in adults, at least 4 severe exacerbations in the last 12 months, oral corticoids equivalent to at least 5 mg of Prednisone for 6 months, compliance with the smoking ban and during the 12 months before the start treatment documented ≥ 300 eosinophils/µl. Evaluation of efficiency in 12 months, but the efficiency criteria are not specified.

3.3. Result

However, it is never possible to indicate biological treatment as the only possible treatment, hence the terms of reimbursement according to § 16 of Act No. 48/1997 Coll. are not filled and reimbursement from public health insurance was not recommended.

4. Discussion

Comparison of disease process dynamics in payment information system with a personal history and family led to suspicion of psychosomatic effects that were subsequently verified. Stress experiences (in our case job, the death of the father) can cause greater lability of the autonomic nervous system, namely by itself, it can lead to emotional triggers of bronchial asthma.

Its deterioration in 2014 was evident by fearing the manifestation of possible skin fatalities disease and led to disability. Despite some calming down in 2015, they are detectable in 2016 laboratory and functional changes, as evidenced by the effect of psychosocial stress on the modulation of function cells of the immune system through both nervous and hormonal roads. Depression and anxiety can be harmful for control asthma, although the relationships between these factors they are complex and can be bidirectional. It's a relationship between functional changes or exacerbations of AB and specific mood and stressful life events.

Psychotherapy may be beneficial in the treatment of asthma, although it was difficult to evaluate its effectiveness in the studies for the diversity of psychotherapeutic methods used, different focus of studies and absence of comparable studies. [14, 15]

5. Conclusion

Psychosocial factors, especially emotions and stress life. events may have a clinical course asthma significant effect. It is desirable to detect them purposefully as they may affect the reporting of symptoms and adherence to treatment and management of the disease. For good asthma management not only drugs are needed, but also solving mental and social situations of patient, which will be reflected in lover economic demands and improved quality of life.

It is expedient to modify them with a suitable therapeutic approach before losing a job potential and need for costly medical medication asthma disease.

References

[1] Terl M. et all. Asthma management: A new phenotype-based approach using presence of eosinophils and allergy, European Journal of allergy and Clinical Immunology 2017, 72 (9) 95-75.

[2] Chung KF, Wenzel SE, Brozek JL, Bush A, Castro M, Sterk PJ, Adcock IM, Bateman ED, Bel EH, Bleecker ER, Boulet LP, Brightling C, Chanez P, Dahlen SE, Djukanovic R, Frey U, Gaga M, Gibson P, Hamid Q, Jajour NN, Mauad T, Sorkness RL, Teague WG.: International ERS/ATS guidelines od definition, evaluation and treatment of severe asthma, Eur Respir J. 2014 Feb; 43 (2): 343-73.

[3] Bourdin, Bjermer, Brightling, Brusselle, Chanez, Chung, Custovic, Diamant, Diver, Djukanovic, Hamerlijnck, Horváth, S. L. Johnston, Kanniess, Papadopoulos, Papi, R. J. Russell, Ryan, Samitas, Tonia, Zervas, Gaga ERS/EAACI statement on severe exacerbations in asthma in adults' facts, priorities and key research questions European respiratory Journal 2019 554: 1900900.

[4] Global Initiative for Asthma. Global strategy for asthma management and prevention. https://ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-June-2019-wms.pdf.

[5] Al-Zahrani JM, Ahmad A, Al-Harbi et al.: Factors associated with poor asthma control in the outpatient clinic setting, April 2015 Annals of Thoracic Medicine 10 (2): 100-4.

[6] Adams, Wilson, Taylor, Daly, Tursan d´Espaignet´, Ruffin: Psychological factors and asthma guality of life: a population-based study, Thorax 2004.

[7] Van Lieshout RJ, Macqueen G: Psychosocial factors in asthma, Allergy Asthma Clin. Immunology 4, 1: 12-28, 2008.

[8] Balardini, Sicuro, Balbi, Canonica, Braid: Psychological aspect in asthma: do psychological factors affect asthma management? Asthma Research and Practice 2015, 1: 7.

[9] Kelsey J. Sharrad, Olatokunbo Sanwo, Kristin V Carson-Chahhoud, Katharine C Pike: Psychological interventions for asthma in children and adolescents Cochrane Database syst. Rev. 2019 Sep, 209 (9).

[10] Barnes PJ: Severe asthma: advances in current management and future therapy. J Allergy Clin Immunol 2012; 129 /1ú: 48-59u.

[11] Corrado Pelaila, C. Crimi, A. Vatrella, C. Tinello, R. Terracciano, Girolamo Pelaila: Molecular Targets for Biological Therapies of Severe Asthma, Front Immunol 2020 Novc 30: 11: 603312.

[12] Ortega H. G et al.: Mepolizumab Treatment in patients with Seevere Eosinophiic Asthma N Engl J Med 2015; 372: 1777.

[13] Humbert Marc et al.: Efect of mepolizumab in severe eosinophilic asthma according to omalizumab eligibility. Respir Med. Jul-Aug 2019; 154: 69-75.

[14] Lehrer, Feldman, Song and Schmaling: Psychological Aspects of Asthma, Journal of Consulting and Clinical Psychology 2002, Vol. 70, No 3, 691-711.

[15] Foster, Lavoie, Boulet: Treatment Adherence and Psychosocial factors in Severe Asthma, European Respiratory Monograph, pp 28-49, March 2011.