

RRI 2016
International Conference «Responsible Research and Innovation»

**BRONCHIAL ASTHMA PSYCHOLOGICAL CORRECTION IN
LARGE INDUSTRIAL CITY**

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Abstract

The psychological assistance to the bronchial asthma patients is an actual problem for the metallurgical plant workers and engineers. Various authors have found a significant prevalence of the disease frequency in industrial areas with a high degree of air pollution compared to the more favorable ecological zones. An adequate mathematical model including the significant regression coefficients, reflecting the influence of Cattall's test variables and disadaptation coefficients have been allocated. The main variables in this equation will be: C, G, ED, NP; the auxiliary ones: H, I (Cattall), A. The developed model reflects the ways of the targeted impacts required by a medical psychologist for adequate psychological correction. On the basis of the model, the authors have developed and tested a program of psycho correctional influences focused on formation of emotional stability and adequate methods of response in a frustration situation. The program demonstrated its positive influence on psychological adaptation and can be used as a method of prevention and rehabilitation of acute asthma exacerbations.

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Keywords: Psychological correction, bronchial asthma, regression coefficient, psychological adaptation, engineer.

1. Introduction

Nowadays, the state of human health actually reflects the state of the ecosystem as the whole. Human body responses to one or another ecological adversity manifest themselves as diseases (allergic diseases, malignant neoplasms, cardiovascular pathology, etc.).

The clinical and experimental studies established that long-term impacts of adverse environmental stresses violate the state of hormonal homeostasis. The highest reactivity to this influence, as we know, is



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shown by the neuroendocrine system.

2. Problem statement

The changes of adaptive hormones levels, particularly those of hydrocortisone and vasopressin by 16% and 17% in terms of the influence on an organism of formaldehyde and the phenolic compounds allocated from polymeric construction materials to the air of the living and working quarters have been established (Koshkina, 1993). When the atmosphere of inhabited places is polluted by nitro compounds and sulfur compounds, an increased activity of organism neuroendocrine functions has been established (Demko, & Zolotuhin, 2005). Inhibition of a morphofunctional state of the endocrine system occurs in case of chronic lead intoxication (Abylayev, & Buchman, 1990). The hormonal disbalance of the organism plays a significant role in the development of many diseases: autoimmune thyroiditis bronchial asthma, diabetes mellitus, hypertension, benign and malignant neoplasms, reproductive system dysfunction (Velichkovskiy, 2008; Kotova, & Livshitz, 1992).

Psychological assistance to bronchial asthma patients is an up to date problem for metallurgical plant workers and engineers. The significant prevalence of the disease frequency in industrial regions with a high extent of air pollution in comparison to more favorable ecological zones has been established by various authors (Koshkina, 2009). This problem is up to date for Magnitogorsk - a large industrial city, for in districts with the high content of pollutants in the atmosphere, the incidence is significantly higher. In situations of environmental pressure, high production strain, systemic stress, psycho-emotional tension some additional requirements for the functioning of the endocrine and nervous stability of the plant workers are requested.

Normally bronchial asthma firstly appears in childhood, but there are cases of its onset among adults, among which in 10-15% of cases, asthma occurs due to factors emerging at work and is called a professional disease.

The professional bronchial asthma is a chronic inflammatory respiratory disease with bronchial hyperactivity, which is manifested by episodes of difficult breathing, wheezing, coughing and caused by contact with chemicals in the workplace. According to "The Global strategy for bronchial asthma - 2004", this pathology is defined as a chronic inflammatory disease of respiratory tracts in which at the cellular level, there are mast, eosinophils, T-lymphocytes, alveolar macrophages. There are more than 350 agents, which can cause bronchial asthma.

Previously, bronchial asthma was considered to be a somatic neurosis, for vivid neuropsychiatric disorders were noted at time of attack and afterwards. Therefore, the leading role was given to the human central nervous system in the pathogenesis of bronchial asthma. Nowadays, in addition to this, asthma is considered to be a psychosomatic reaction to conflict situations. There are two psychosomatic mechanisms explaining the damage of the central nervous system and psyche in case of bronchial asthma (Bulatov, & Uspenskaya, 1974):

1. «Pathological dominant» as per Ukhtomsky. On the basis of the unconditioned reflex, a conditioned one – a hotbed of stagnant excitation in the higher parts of the brain is being formed. This gives rise to neurasthenia with the "attack of the pathological dominant". Disorders of the nervous system are secondary at the background of the allergic process. There is no attenuation of reflex, and allergic

reactions are strengthened by the unconditioned reflex. Asthma is not a psychogenic disease though the mental factor is of very great importance.

2. Tissue sensitization. The tissue of the nervous system can be the object of the influence of biologically active substances, which are formed in them or in the adjacent tissues in case of allergy. The expressed morphological changes can be seen in the diencephalon tissues in the form of dilated vessels, small venous edema.

Each patient with bronchial asthma is a person in a state of neurosis starting from the highest part of the nervous system and finishing with the projection to the vegetative innervation. The manifestation of psycho- and neurasthenia in patients is the characteristic feature of their mentality. They tend to escape into disease experiencing the fear of attacks. The severe development is characterized by isolation, resentment, gloom and impoverishment of the emotional sphere (Fadeev, 2010).

In the course of the attack, a patient experiences an acute shortage of air, he "fights" for air, gasping breathes, wherein firstly the exhalation is hampered and prolonged, which becomes loud and clearly audible. Upon exposure of the initiating factor, the mast cells and macrophages are being activated. This releases a particular number of mediators (histamine, bradykinin, etc.) which influence directly the muscles of respiratory tracts and capillary permeability and cause an intensive local reaction which leads to the asthmatic attack.

«The experience of patients in the course of attack and in sub acute conditions of light lack of air is limited exclusively by the act of breathing. The patient is absorbed by the state of his breathing. It is noteworthy in his behavior that in the course of the attack, he is not available, kept aloof, and it is difficult to establish contact with him. This differentiates asthmatics from other patients with pulmonary diseases, accompanied by dyspnea» (Brautigam, Christian, Rad, 1999). Indeed, in cases of chronic asthma, there is the increasingly growing trend of patients' self-isolation.

The violations of the higher nervous function in the form of a reduction of closing functions, the presence of phase states, weakness of active inhibition processes, expressed in the phenomenon of dystonia, the predominance of the parasympathetic tone of the nervous system and paradoxical reactivity of the sympathetic division have been established. In the functioning of the endocrine system, the interference among a glucocorticoid failure, allergic reaction and an attack was detected, which in turn causes a glucocorticoid deficiency. The interrelation begins to act as a result of stress. The adaptation is broken, the hormonal balance between the suprarenal cortex and a hypothesis is changed. Studying the problem of professional bronchial asthma of workers of the metallurgical plant at all levels, it is impossible to exclude the mental component and the work of the psychologist. Psychological support begins at the early stages of the disease; it helps to overcome irritation and depression associated with chronic illness and the fear of physical activity. Further, various techniques based on biological feedback, relaxation therapy, individual, family and group psychology are advisable to use in the treatment of bronchial asthma.

3.Results

The psychological correction does not set the task of treatment. Sometimes, even the use of modern remedies does not bring a desirable result.

At the first stage, a psychological diagnosis was carried out. Cattell test and Rosenzweig test were used as methods of empirical research. At the second stage, modeling of the psychological treatment program for workers with asthma took place (Ruslyakova, 2004; 2013).

The Sixteen Personality Factor Questionnaire (16PF) is a self-report personality test developed over several decades of empirical research by Raymond B. Cattell, Maurice Tatsuoka and Herbert Eber. The 16PF provides a measure of normal personality and can also be used by psychologists and other mental health professionals as a clinical instrument to help to diagnose psychiatric disorders as well as the assistance with prognosis and therapy planning. The 16PF instrument provides clinicians with a normal-range measurement of anxiety, adjustment, emotional stability and behavioral problems. Rosenzweig's Picture Frustration (PF) study is a projective test, designed to measure characteristic modes of responding to frustration. According to the responses, the direction of aggression (directed inwards - intraggression (IA), when it is turned by the subject onto him or herself; directed outwards - includes extraggression (EA), when aggression is turned onto the environment; or repressed - imaggression (MA), in which aggression is evaded in an attempt to gloss over the frustration) and the type of aggression, including obstacle-dominance (OD) (frustrating objects stand out), ego-defence (ED) (the respondent's ego predominates to protect itself), and need-persistence (NP) (the respondent pursues goals despite frustration) are scored. In addition, a group conformity rating is provided, indicating how closely the responses resemble the most common responses or population norms.

The objective is the prevention of emergence of the pathological process of disadaptation, an increase of remission between exacerbations, the prevention of neuro - mental disorders accompanying bronchial asthma.

The attacks typical for bronchial asthma are the most powerful stress factor forming the expressed anxiety in traits of a personality. The fear of attacks, the need for compliance with all medical prescriptions, the violation of social contacts strengthen a psycho emotional strain and support manifestations of stress even in the in-between attacks period. In addition, the constantly increasing intensity of social and informational factors reinforces the dynamic ratio of psyche and that of the environment. This increases the demands for the adaptation mechanisms. Consolidation of a mechanism of pathological adaptation exacerbates the disease. It is obvious that bronchial asthma forms disharmony of personal traits typical for psychological maladjustment. Therefore, during the treatment of people suffering from bronchial asthma, it is necessary to include adequate methods of psychological correction which will form new attitudes and forms of behavior. Such opportunity is given to the psychologist if he will use more complete and precise methods of mathematical statistics.

On this basis, for modeling psychological correction programs (group psychological training), the method of classical regression analysis was used with the construction of a polynomial model of the second order, which consisted of 17 variables (R. Cattell and C. Rosenzweig's test factors) (Cattell's test 16pf - 16 personality factors questionnaire and Rosenzweig's Picture-frustration (Pf) Study), their linear effects, quadratic effects and interaction effects.

As an output variable, we have introduced the disadaptation coefficient (DC), calculated in the formula of I. Mamaychuk (Professor of St. Petersburg State University, Doctor of Psychology, Faculty of St. Petersburg State University of Psychology, the leading expert in child clinical psychology), for it is more "sensitive" and more accurately reflects the state and the level of adaptation than DC developed by F.

Berezin (Professor of I.M. Sechenov First Moscow State Medical University, Doctor of Medical Sciences – psychologist). The presence of a significant correlation connection always implies the existence of substantial regressive relation. However, the correlation matrix is used in a dozen of different analyses, and it may be called the source material, rather than the result of processing. It shows a complex of paired interrelations of the studied variables, but only the regression model allows one to determine the form (type) of this relationship (linear or any nonlinear). Regression analysis suggests estimation of the regression coefficient, the understanding of the level of its significance and assessment of the adequacy of the resulting model to the opportunity of predicting outcomes inside and outside of the field of research. It is necessary for the creation of the psychological correctional program of the plant workers' personality suffering from bronchial asthma. By using regression analysis, we can determine variables most significantly influencing the factor of disadaptation according to their importance and direction with greater tolerance in respect of linear correlation.

There were the following results of the regression analysis:

1. An adequate mathematical model has been developed that includes significant regression coefficients, reflecting the impact of the following variables: C (Cattell's primary factor, descriptors of low range: reactive emotionally, changeable, affected by feelings, emotionally less stable, easily upset); G (Cattell's primary factor, descriptors of low range: expedient, nonconforming, disregards rules, self-indulgent); ED (Rosenzweig's type of aggression, descriptors of low range: the type of aggression includes ego defense (ED), in which the ego of the subject predominates to defend itself); NP (Rosenzweig's type of aggression, descriptors of low range: the type of aggression includes need-persistence (NP), in which the solution of the frustrating problem is emphasized by pursuing the goal despite the obstacle), on response. In particular, the level and the direction of the influence was determined.

2. The developed model corresponds to the degree of determination, 70,27%. Therefore, the proportion of random disturbances and unaccounted factors in the experiment factors constitutes only 29,73%.

3. On the basis of the resulting model, forecasting of parameter (DC) has been carried out. The resulting model itself reflects the ways of the targeted influence necessary for a medical psychologist for an adequate psychological correction.

The sample size based on which the model was constructed constitutes 100 examinees (metallurgical plant workers suffering from asthma). The extent of determination of $R = 0,7027$.

Considering the data of the classical regression analysis on the declared variables among industrial plant workers suffering from bronchial asthma, in general, and in particular, among patients with various degrees of the disease severity, it is possible to allocate the basic, typical for all groups input variables, which determine DC. These variables are: C (Cattell's primary factor, descriptors of low range: reactive emotionally, changeable, affected by feelings, emotionally less stable, easily upset), G (Cattell's primary factor, descriptors of low range: expedient, nonconforming, disregards rules, self-indulgent), ED (Rosenzweig's type of aggression, descriptors of low range: the type of aggression includes ego defense (ED), in which the ego of the subject predominates to defend itself), NP (Rosenzweig's type of aggression, descriptors of low range: the type of aggression includes need-persistence (NP), in which the solution of the frustrating problem is emphasized by pursuing the goal despite the obstacle), H (Cattell's

primary factor, descriptors of low range: shy, threat-sensitive, timid, hesitant, intimidated), I+ (Cattell's primary factor, descriptors of high range: utilitarian, objective, unsentimental, tough minded, self-reliant, no-nonsense, rough), A (Cattell's primary factor, descriptors of low range: impersonal, distant, cool, reserved, detached, formal, aloof). The above-mentioned variables are listed in order of importance of their influence, interaction, occurrence in regression models in each group).

Thus, we can construct the regression equation on the basis of which it will be possible to carry out the target creation of an adequate psychological correctional program, in the form of a group psychological training. The main variables in this equation are: emotional stability (C); rule-consciousness (G); the type of aggression: ego defense (ED), in which the ego of the subject predominates to defend itself; and need-persistence (NP), in which the solution of the frustrating problem is emphasized by pursuing the goal despite the obstacle; auxiliary variables: social boldness (H), sensitivity (I), warmth (A). That is, the psychological correctional program of patients with bronchial asthma (group training), aimed at improving quantitative and qualitative indicators of adaptation they have, should include: stronger influence on the psychological and emotional regulation; the formation of the enforcement to perform all the necessary medical procedures; the formation of the active position of responsibility in relation to health, treatment and recovery; the formation of new directions in thinking; the formation of new constructive attitudes and forms of behavior. It is better to strengthen these main ways of psychological correction of the teenagers having bronchial asthma in order to obtain a more stable effect better with auxiliary variables. The sphere of social contact, an interpersonal level of communication; confident behavior skills, self-esteem should not be overlooked. Only in this case, in psychological correction of teenagers suffering from bronchial asthma, it is possible to achieve the set goal - improvement of adaptability. Combined with traditional medical therapy, psychological correction will contribute to the effectiveness of treatment, increase the period of remission and possibly reduce the time and the doses of used drugs.

4. Discussion

Theoretical understanding of the problem determines the approach to psychotherapy, but, in principle, is not able to prescribe all therapy to its full extent and to the finest step.

But to a greater extent, the effectiveness of the therapy is influenced by interaction between a physician and a psychologist. "A psychologist and a physician should form a productive partnership and work in tandem." Close cooperation between medical specialists and psychologists should be based on mutual understanding and respect for the professional knowledge of each other. Thus, the one sided approach is the main drawback of the treatment; a more effective way would be the treatment with the combination of simultaneous influence on a patient of both a clinical psychologist and a physician. The combination of the two approaches - therapeutic and psychological – defines, as a rule, a good prognosis and appropriate socio-psychological rehabilitation.

Psychological correction is one of the important links in the system of medical rehabilitation of patients of different nosological groups. Psychological correction of personality disorders of patients with bronchial asthma is a well-organized system of psychological impact. It is mainly aimed at the elimination of the secondary negative personal reactions conditioned by emotional disorders, such as

anxiety, suspiciousness and alleviation of emotional discomfort associated with the impaired system of relations.

5. Conclusion

The program of psycho-correctional influences developed and approved by the authors, aimed at formation of emotional stability and adequate methods of response in a situation of frustration, displayed its positive impact on the psychological adaptation and can be used as a method of prevention and rehabilitation in health care institutions and specialized departments of hospitals.

Acknowledgements

The authors of the paper are grateful to Tomsk Polytechnic University for the organization of the «RRI 2016» international conference and the opportunity to publish the results of our research.

We express our gratitude to our supervisor and mentor Mamaychuk Irina Ivanovna, Doctor of Psychology, Faculty of St. Petersburg State University of Psychology, the leading expert in child clinical psychology.

References

- Abylayev, J. A., & Buchman, I. (1990). Possible mechanisms of osteopathy in patients with chronic lead intoxication. *Hygiene of labor and professional disease*, 2, 31-35.
- Brautigam, W., Christian, P., & Rad, M. (1999). *Psychosomatic medicine*. 376.
- Bulatov, P. K., & Uspenskaya, E. P. (1974). Treatment of patients with bronchial asthma in the hyperbaric chamber. 5, 125-128.
- Cattell, R.B., Boyle, G.J., & Chant, D. (2002). The enriched behavioral prediction equation and its impact on structured learning and the dynamic calculus. *Psychological Review*, 109, 202-205.
- Demko, P.C. & Zolotukhin, M. I. (2005). The morphology of the neuroendocrine system in sensitization and anaphylaxis. *Medicine in Kuzbass*, 4, 40-42.
- Fadeev, P.A. (2010). Bronchial asthma. *The World and Formation, Onyx*, 160.
- Koshkina, V.S. (2009). Pathological and histological aspects of the causes of death of people living in the industrial city with the developed industry of ferrous metallurgy. *Actual problems of modern science*, 9-1, 47-56.
- Koshkina, V.S. (1993). Lung cancer and occupational factors in ferrous metallurgy. *Occupational Medicine and industrial environment*. 5-6, 44-46.
- Kotova, G.A., & Livshits, G.Y. (1992). On myocardial damage in Hyper - and hypothyroidism. *Problems of endocrinology*, 38-1, 24 - 27.
- Rosenzweig, S., & Adelman, S. (1977). Construct validity of the Rosenzweig Picture-Frustration (P-F) Study. *Journal of Personality Assessment*, 41, 578-588.
- Ruslyakova, E.E. (2004). Psychological characteristics of adolescents suffering from bronchial asthma and psychological correction methods. *PhD dissertation (Psychology). S.-Peterb. gos.universitet, St. Petersburg*.
- Ruslyakova, E.E. (2013). Psychological peculiarities of the teenagers, suffering from bronchial asthma, peculiarities and methods of psychological correction. *Applied and Fundamental Studies. St. Louis, Missouri, USA, 30-31 August. Proceedings of the third International Academic Conference. Publishing House Science and Innovation Center, Ltd.*, 324-329.
- Velichkovskiy, B.T. (2008). The viability of the nation. The special role of motivation and social stress. *Human ecology*, 10, 3-8.