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CHANGES IN THE FUNCTIONAL STATE OF THE THYROID GLAND IN CHILDREN WITH BRONCHIAL ASTHMA

Djurayev Muzaffar Gulamovich, Kaxarov Abdukaxar Nabijonovich

Department of Infectious diseases, Andijan State Medical Institute,

Andijan, Uzbekistan

Abstract: Recently, bronchial asthma has become “younger” and has begun to occur even in young children, which is explained by a number of reasons: the presence of environmental problems, the use of a huge range of different chemicals in everyday life, the often uncontrolled use of drugs and many other unfavorable factors of exogenous and endogenously affecting the body [1].

Keywords: Children, cystic fibrosis, bronchial asthma, tireostat.

Bronchial asthma has been studied quite comprehensively, but to this day there are not enough reports in the literature about the features of the clinic, course and therapy of this disease in various functional conditions of the thyroid gland. In scientific studies on bronchial asthma, no comparison was made of changes in thyroid function indicators with varying severity of the course of this disease, which, in our opinion, is extremely important for people living in regions of goiter endemic, one of which is the Fergana Valley of the Republic of Uzbekistan. On the other hand, thyroid hormones have a significant effect on the respiratory system. Thus, the effect of thyroid hormones on the formation of the respiratory system was revealed already at the stage of intrauterine development. The inner germ leaf forms both the respiratory organs and the main part of the thyroid gland. Her hormones affect receptor synthesis and surfactant production [5]. In this regard, disorders in the hypothalamus-pituitary-adrenal gland system and the thyroid system are an important pathogenic link in the formation of bronchial asthma. The problem of a detailed study of the functional state of the thyroid gland in children with bronchial asthma, especially in conditions of goiter endemic, needs a subsequent solution.

Research materials and methods. The work was carried out on the basis of the Andijan Regional Children's Medical Center of the Republic of Uzbekistan. 89 patients with atopic bronchial asthma, aged from 2 to 14 years, were examined. The study included 19 (44%) children with mild bronchial asthma, 41 (47%) children with moderate course of the disease and 29 (9%) children with severe asthma. All the children studied had an atypical form of the disease. The examination was carried out in the acute phase. The control group consisted of 128 children of the appropriate age with unchanged thyroid function who were not registered at the dispensary for allergic diseases.

The assessment of the functional activity of the thyroid gland was carried out by radioimmunological method using standard radio immunological and enzyme immunoassay kits of foreign production. The levels of thyroid stimulating hormone (TSH) of the pituitary gland, triiodothyronine (TK), thyroxine (T4) and free thyroxine were assessed. To assess the functional state of the pituitary thyroid axis, the coefficients TK/T4, TSH/TK, TSH/T4, thyroid index TI = (T3+T4) were determined/TTG. Along with this, we studied autoantibodies to thyroperoxidase (AT-TPO) — circulating immunoglobulins against microsomal antigen of thyroid cells; autoantibodies to thyroglobulin (AT-TG) — circulating immunoglobulins against human thyroglobulin molecule. Traditional methods of variational (parametric and nonparametric) statistics are used in statistical data processing.

The results and their discussion.

The results of studying the functional state of the thyroid gland in children with bronchial asthma have shown that with an aggravation of the severity of bronchial asthma, a decrease in thyroid function occurs. Thus, in patients with mild and moderate severity of bronchial asthma, there is an unreliable decrease in the concentration of triiodothyronine and thyroxine. However, despite this, there is a positive response from TTT ($p < 0.01$). In children with severe asthma, there was a significant increase in TSH secretion ($p<0.001$) against the background of a sharp decrease in triiodothyronine and thyroxine ($p < 0.001$). Given the presence of endocrine adaptation mechanisms in bronchial asthma, a decrease in T4 levels is obviously the result of its intensive transformation into a more active TK in conditions of increased activity of the sympathoadrenal system against the background of constantly recurring stressful situations [6]. A significant increase in TSH in the acute phase of severe asthma against the background of an increase in the TSH/TK coefficient and a decrease in TI ($p<0.001$) indicates the most pronounced deficiency of thyroid hormones in patients with severe bronchial asthma.

Difficult-to-detect airway obstruction against the background of "laboratory hypothyroidism" may indicate an inadequate increase in TG levels, which is not sufficient to maintain oxidative reduction processes at the required level. This is due to the presence of an edematous mechanism of bronchial obstruction [4].

Of particular interest is the study of the concentration of free thyroxine in blood serum. Thus, the concentration of this hormone turned out to be significantly low in patients with mild bronchial asthma ($p<0.001$), and in patients with severe asthma it turned out to be even lower compared with mild and moderate bronchial asthma ($p<0.001$). Therefore, the determination of this hormone is relevant to identify the subclinical course of thyroid diseases, in which the level of total TK and T4 remains normal. The results of studying some immunological parameters of the thyroid gland allowed us to establish that autoantibodies to thyroperoxidase and thyroglobulin began to be detected already in patients with mild bronchial asthma, the maximum concentration of which was detected in patients with severe asthma ($p<0.001$). Our results emphasize that the presence of AT-TG is associated with autoimmune thyroid damage.

Thus, changes in the hormonal system in patients with bronchial asthma are in a state of protective adaptation with rapid depletion of these processes in severe bronchial asthma, which is accompanied by hormonal imbalance[7]. The clinical manifestations of thyroid hypofunction are diverse, many of them are nonspecific, which is why certain difficulties in its timely recognition are associated. In this regard, we have made an attempt to identify specific complaints of patients with bronchial asthma regarding hypofunction of the styloid gland. Studies have shown that there were no significant specific symptoms of thyroid hypofunction in mild and moderate asthma. However, in the severe course of this disease, a number of signs were revealed indicating a decrease in the functional state of the thyroid gland. Thus, one of the frequent complaints of patients with severe bronchial asthma was subjective sensations in the form of fatigue, weakness and drowsiness. Disorders of the central nervous system in patients of this group were manifested primarily by irritability, anxiety, sleep and memory disorders [8]. Children were most often uncommunicative, emotionally unstable, often complained of headaches, dizziness, tinnitus, head, impaired vision and hearing, they have a low timbre of voice, a history of unstable stools, sometimes followed by constipation. Objectively, 41.4% of patients with severe bronchial asthma had grade I–II thyroid hyperplasia.

The skin of sick children was characterized by dryness, roughness, thinness, hair was dry and more sparse. there were also signs of hair loss, thinning of eyebrows and eyelashes. Pallor, unexpressed puffiness, accompanied by thickening of the skin, were most typical for children with severe bronchial asthma. These symptoms seem to be associated with a deterioration in the blood supply to the skin, as evidenced by the chilliness and cold of the extremities in these children, as well as with concomitant anemia, which leads to an increase in the frequency of this symptom. When interpreting symptoms such as pallor, puffiness of the face and swelling of the extremities [2], it is necessary to remember about the conjugation of metabolic disorders of glucuronic acid in hypothyroidism [3]. In this regard, we agree with the opinion of a number of authors [9] that as the functional activity of the thyroid gland decreases, deposits of mucin and glycosaminoglycans with hydrophilic properties in the connective tissue of the bronchi increase [5], and their excess changes the structure of connective tissue, enhances its hydrophilic properties, binds sodium and complicates lymph outflow. In some cases, the resulting swelling of the bronchial mucosa in hypothyroidism contributes to the development and self-maintenance of bronchoobstructive syndrome [10]. Children suffering from bronchial asthma were more prone to hypertensive vascular dystonia than hypotonic type. A similar association of cases of increased incidence of hypertension in school-age children than with thyroid hypofunction was found earlier by other researchers in our region, although it is known that renin activity and aldosterone levels in the blood of patients with hypothyroidism are slightly reduced [5]. In our opinion, due to the dystonia of the renin-angiotensin-aldosterone system, sodium retention occurs in the body, an increase in the volume of extracellular fluid, contributing to a decrease in renal filtration in the homeules and an increase in sodium reabsorption in the tubules.

Changes in the cardiovascular system in children with severe bronchial asthma were characterized by the appearance of systolic noise at the apex, at the Botkin-Erb point, a weakening of tones at the apex, some amplification on the aorta and on the pulmonary artery, percussion expansion of the boundaries of the heart, apparently associated with tonogenic myocardial dilation. ECG changes included a decrease in the amplitude of the pacemaker migration complex, impaired intraventricular conduction, and a high frequency of violations of repolarization processes [11]. All these signs indirectly indicate a decrease in the functional state of the thyroid gland.

Conclusions:

1. The degree of influence of thyroid hormones on metabolism in general and on the course of asthma is obvious. Our results allow us to predict the development of dysthyroidism with a tendency to decrease the production of thyroid hormones in patients with bronchial asthma, even in the absence of clinical symptoms of hypothyroidism.

2. Subclinical (or "laboratory") hypothyroidism developed, as a rule, in patients with moderate to severe bronchial asthma. The high frequency of detection of autoantibodies to TPO and TG indicates the involvement of this organ in the immuno-inflammatory process, and the nature of hormonal disorders in patients with bronchial asthma requires further research, as well as dynamic monitoring.

3. The choice of methods of rehabilitation programs should be based on an individually differentiated approach to each child and should be carried out even at the stage of frequent colds, preferably before the clinical manifestation of hypothyroidism in patients with bronchial asthma.

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