We observed 60 children with chronic pneumonia aged from 3 to 14 years compared with 20 healthy children of the same age. Analysis of the biochemical data in children who received thiotriazoline showed reliable reduce of malondialdehyde and dien conjugates in comparison with control group. The levels of superoxiddismutase and catalase increased. The results of immunological investigations showed that in children who took thiotriazoline noted reliable increase of T-lymphocytes, T-helpers, T-suppressors and phagocytic activity of neutrophils. As to humoral immunity, in the majority of patients there was found increase in the levels of IgA and IgM.

Keywords: Children, chronic pneumonia, biochemistry, immunology, treatment.

UDC: 616.24-002.2-053.2-085

Introduction

The problem of chronic pulmonary diseases (CPD) in children is under continuous attention of all pediatricians over the world. As Zakharov et al. (2001) reported, despite the growth and development of methods of diagnosis, treatment and prognosis, the incidence rate and prevalence of this pathology has tendency to increase.

The occurrence, development and outcome of chronic pneumonia (CP) has strong correlation with the complex of factors of non-specific body resistance as well as the state of lipid peroxidation (LP) - antioxidant system (AOS) and immune status (Surin, 1998). The current pharmacological agents for correction of these disturbances have as a rule partial activity, and search of more universal means for pathogenic therapy of CP acquires special importance (Geronina, 2004).

Taking into account the character of disturbances found in CP, their relation with mechanisms of non-specific resistance and immunological defense, as well as LP-AOS state, it is advisable to use in the complex therapy the agents with wide spectrum of pharmacological activity providing correction of the disturbances both in lipid metabolism in the biomembranes of the cells targets and in the immunocompetent cells.

The above-mentioned shows a need in deep studying of the characteristic features of CP in children, identifying factors contributing to their growth and developing of differential programs for management of this category of patients.

The therapeutic agent thyotriazoline has met well these requirements because of its high efficacy with wide spectrum of effects, having antioxidant, membrane-stabilizing, immunomodulating and anti-inflammatory activity.

The purpose of our study was to evaluate the efficacy of thyotriazoline in the treatment of children with chronic pneumonia.

Materials and methods

Sixty children of preschool and school age with CP were participated in this study. The group of comparison included 20 healthy children of similar age.

The patients were divided into two groups: control group - 40 children receiving the common basic therapy, and the target group of 20 children who additionally to the traditional therapy received thyotriazoline. The preparation was prescribed in form of
2.5% solution in daily dose 2 mg/kg in NaCl solution intravenously dropping for 5-10 days with consequent transition to tablets during one month.

Diagnosis was made on the basis of classification of clinical forms of broncho-pulmonary diseases approved in Moscow at the Symposium on improvement of classification of non-specific diseases of lungs in children (1995), and was based on the findings of medical history, clinical and laboratory examinations.

All children had immunological investigations: determination of the amount of T-lymphocytes (CD3⁺), T-helpers (CD4⁺), T-suppressors (CD8⁺), natural killers (CD16⁺), B-lymphocytes (CD19⁺) with a method modified by Garib et al. (1995) as well as concentration of serum immunoglobulins A, M, and G in peripheral blood by Mancini et al. method (1965); phagocytic activity of neutrophils (PAN). All these analyses were performed in the Institute of Immunology of the Academy of Sciences (Uzbekistan).

For evaluation of LP activity in lymphocyte membranes there were measured the contents of dien conjugates (DC) by Gavrilov method (Gavrilov et al., 1987), malondialdehyde (MDA) by method of Andreev et al. (1988). The state of AOS was characterized by activity of superoxidismutase (SOD) and catalase (CT) (Koroluk et al., 1988).

The data were treated with use of methods of variation statistics by Fisher-Students with use of personal computers and special programs.

**Results and discussion**

The reliable different dynamics of biochemical parameters was observed in the studied groups in relation to the type of therapy performed. In the patients of control group receiving basic therapy there was noted reduction in MDA level to 6.2±0.3 nmol/ml and DC levels to 3.4±0.05 nmol/ml in comparison with parameters before treatment (P<0.05), however, they remained to be higher than norm. The parameters of SOD and CT increased to 1.4±0.08 U/mg and 8.2±0.7 U/mg respectively, in comparison with levels before treatment (P>0.05).

In the studied group of children receiving thyotriazoline there was noted more marked dynamics of parameters including reliable reduction in MDA level to 4.1±0.04 nmol/ml and DC levels to 2.0±0.04 nmol/ml, in comparison with control (6.2±0.3; 2.4±0.05, respectively P<0.001). There was revealed increase in level of SOD to 2.0±0.04 U/mg (P<0.01) and CT to 10.2±0.5 U/mg (P<0.05). It was found that thyotriazoline in the contents of traditional therapy prevented activation LP-AOS in lymphocyte membranes.

**Table 1. Immunologic parameters in children with chronic pneumonia receiving thyotriazoline, M±M**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Practically healthy children n=20 (I)</th>
<th>Before treatment n=40 (II)</th>
<th>Control group n=40 (III)</th>
<th>Studied group n=20 (IV)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD3⁺, %</td>
<td>68.4±1.7</td>
<td>46.2±0.8</td>
<td>49.1±0.7</td>
<td>54.8±0.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CD4⁺, %</td>
<td>45.3±1.6</td>
<td>29.1±1.7</td>
<td>32.2±0.9</td>
<td>38.4±1.0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>CD8⁺, %</td>
<td>23.5±0.8</td>
<td>20.2±0.7</td>
<td>21.6±0.4</td>
<td>23.2±0.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>CD19⁺, %</td>
<td>15.1±1.1</td>
<td>27.6±0.5</td>
<td>25.6±0.7</td>
<td>17.4±0.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>IgG, mg/%</td>
<td>161.0±6.0</td>
<td>123.0±6.7</td>
<td>134.4±7.0</td>
<td>159.0±6.4</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>IgM, mg/%</td>
<td>102.0±7.0</td>
<td>134.0±8.1</td>
<td>126.0±6.1</td>
<td>106.0±7.2</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>IgA, mg/%</td>
<td>1126.0±21.0</td>
<td>860.0±17.8</td>
<td>906.0±16.0</td>
<td>1052.0±12.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>CD16⁺, %</td>
<td>9.1±0.6</td>
<td>6.1±0.7</td>
<td>6.8±0.7</td>
<td>8.9±0.6</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>PAN, %</td>
<td>67.7±2.4</td>
<td>40.1±4.8</td>
<td>49.1±2.8</td>
<td>56.4±2.0</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Note: P - reliability of differences between parameters of III and IV groups.

The study of the major immunological parameters which are illustrated in Table 1 showed that in children of control group receiving basic therapy there was observed change of percent content of T-lymphocytes (CD3⁺) (49.1±0.7% vs. 46.2±0.8%; P<0.05), B-
lymphocytes (CD\textsuperscript{19\textsuperscript{+}}) (25.6±0.7% vs. 27.6±0.5%; P<0.05), T-helpers (CD\textsuperscript{4\textsuperscript{+}}) (mean 32.2±0.9% vs. 29.1±1.7%; P>0.05), and T-suppressors (CD\textsuperscript{8\textsuperscript{+}}) (21.6±0.4% vs. 20.2±0.7%; P>0.05), in comparison with parameters before treatment. Also we revealed different direction unreliable changes in the parameters of immunoglobulins (IgG, IgM, IgA), natural killers (NK) (CD\textsuperscript{16\textsuperscript{+}}) and PAN (P>0.05).

While prescribing thiotriazoline to the patients from studied group there was noted reliable increase in T-lymphocytes (CD\textsuperscript{3\textsuperscript{+}}) to 54.8±0.8% (P<0.001), T-suppressors (CD\textsuperscript{8\textsuperscript{+}}) to 23.2±0.7 (P<0.05), T-helpers (CD\textsuperscript{4\textsuperscript{+}}) to 38.4±1.0% (P<0.01), reliable reduction of B-lymphocytes (CD\textsuperscript{19\textsuperscript{+}}) to 17.4±0.6 (P<0.05), in comparison with parameters of control group. The content of IgG had tendency for increase to 159.0±6.4 mg% vs. 134.4±7.0 mg% (P<0.05); and the content of serum IgM reduced to 106.0±7.2 mg% vs. 134.4±7.0 mg% (P<0.05). The content of IgA increased and amounted in mean 1052.0±12.8 mg% vs. 906.0±16.0 mg% (P<0.05). The content of NK (CD\textsuperscript{16\textsuperscript{+}}) increased to 8.9±0.6% vs. 6.8±0.7% (P<0.05). PAN increased to 56.4±2.0% vs. 49.1±2.8% (P<0.05). In this case, thyotriazoline influences on the immune system by LP inhibition and AOS activation. Thus, our study confirmed membrane-stabilizing and antioxidant abilities of thyotriazoline as well as there was revealed immunomodulating effect of the preparation that allows recommendation of this therapeutic agent for more wide use in the treatment of children with chronic pneumonia.

**Conclusion**

In chronic pneumonia children there were observed changes in LP-AOS system and immune status which were persistent after performed traditional therapy as well as identified even in the remission period of disease. Inclusion of thyotriazoline into the complex therapy of the patients with chronic pneumonia provides membrane-stabilizing, antioxidant and indirect immunomodulating effect.

**References**


