

# Phytotherapy in the Complex Treatment of Patients with Drug-Resistant Forms of Pulmonary Tuberculosis

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## **Abstract.**

**Purpose:** to develop a technology for complex treatment of drug-resistant pulmonary tuberculosis in combination with herbal medicine.

**Material and Methods:** The immunological status was studied in 125 patients with drug-resistant pulmonary tuberculosis, a significant suppression of immunity indicators was established.

**Results:** Schemes for the use of an immunomodulator - hemalin with medicinal herbs of immunocorrective action - were proposed. It has been proven that the combination of hemalin with the infusion of the string is more effective, which has the most stimulating effect on the indicators of the immune status.

**Keywords:** pulmonary tuberculosis, drug-resistant tuberculosis, immune system, herbal medicine.

**Introduction:** Tuberculosis poses a serious threat to public health throughout the world. Today, as in past centuries, tuberculosis remains the leading cause of death among all infectious diseases. About a third of the world's population is infected with mycobacterium tuberculosis and is at risk of developing this disease. About 3 million people die from tuberculosis in the world every year, and about 350 people die every hour. Tuberculosis takes the leading place in the structure of socially significant diseases every year. In the structure of tuberculosis, a special place is occupied by drug-resistant tuberculosis, which is a global problem throughout the world [3].

The problem of increasing the effectiveness of treatment of patients with destructive forms of drug-resistant pulmonary tuberculosis is currently extremely urgent and not fully resolved [2; 3]. As you know, pronounced manifestations of tuberculosis are associated with immunosuppression, which reduces the clinical effect of the therapy [5,6,7].

A number of studies have found that well-known immunocorrectors (thymogen, thymalin, T-activin, etc.) used against the background of complex treatment of pulmonary tuberculosis contribute to an increase in the effectiveness of treatment [4]. Due to the fact that immunity disorders are associated with a decrease in the effectiveness of tuberculosis treatment, the concept of immunostimulation as a method of treating secondary immunodeficiency was developed and effectively applied [5].

The appearance and reproduction in the process of treatment of drug-resistant forms of mycobacterium tuberculosis serve as evidence of the weakening of the body's natural defenses. Indeed, the appointment of standard chemotherapy regimens in some patients leads to the development of drug resistance, while in others, mycobacterium tuberculosis continues to remain sensitive to antibacterial drugs. The study of the problem of the state of the immune system in patients with multidrug-resistant tuberculosis is relevant and not fully understood. Also, methods of immunocorrection using medicinal herbs have not been developed.

**Objective:** To study some indicators of immunity and to develop schemes for the use of immunomodulators of plant origin in patients with pulmonary tuberculosis with drug resistance to chemotherapy.

### **Material and research methods:**

To achieve this goal, 125 previously treated patients with drug resistance (DR) were examined. Among the clinical forms, patients with fibrous-cavernous pulmonary tuberculosis prevailed - 90 (72.0 ± 4.0%), infiltrative tuberculosis was 13 (10.4 ± 2.7%), disseminated - 22 (17.6 ± 3.4 %). In 20 (16.0 ± 3.2%) patients, the process proceeded as caseous pneumonia. All patients received the following chemotherapy: intravenous isoniazid rifampicin 0.45 or oflodex 800mg + pyrazinamide 1.5mg + kanamycin (amikacin) 1.0 + prothionamide 0.75. Thirty patients were additionally prescribed 0.75 cycloserine.

As an immunocorrector used the domestic drug "Gemalin", created on the basis of animal plasma for the treatment of immune disorders and associated pathologies. The drug has an immunomodulatory effect, stimulates the formation of antibodies and the cooperative immune response of T- and B-lymphocytes.

Burrow herb - contains flavonoids, organic acids, ascorbic acid, carotene, essential oils, trace elements. It has antioxidant, anti-inflammatory, pathogenic effects, normalizes metabolism. Oregano, the main component is essential oils, which enhance the secretion of the bronchial and digestive glands, improve bowel function, in addition, the herb contains tannins, ascorbic acid and flavonoids. Licorice root - contains glycyrrhizin. Due to the content of a large amount of mucous substances in licorice, it is effective in respiratory diseases. According to experimental data, infusions of licorice root and oregano significantly enhance the formation of EAC-ROC [1].

Depending on the nature of immunocorrection, the examined patients were divided into 4 groups:

Group 1 - 25 patients who additionally received hemalin immunocorrector according to the scheme intramuscularly, daily in an increasing dose for 5 days (from 1 ml to 3 ml). The course of treatment consisted of 3 cycles, breaks between cycles - 5 days.

Group 2 35 patients received the combination: hemalin according to the scheme of 3 courses and an infusion of a series with a period of 2 months. The infusion of the series was prepared as follows: 10 g (3 tablespoons) of herbs are placed in an enamel bowl, 200 ml (1 glass) are poured with hot boiled water and heated in a boiling water bath for 15 minutes, then cooled for 45 minutes, filtered and the remaining mass is wrung out. The resulting infusion is added with water to the initial volume of 200 ml. Take 1/2 cup 3 times a day after meals.

Group 3 - 25 patients who received additionally within 2 months herbal collection of medicinal herbs: oregano - 10.0 g; licorice root - 10.0 g; succession - 10.0 g.

The collection is poured with 1 liter of boiling water, heated in a water bath (90°C) for 10 minutes, cooled, filtered. Take within 2 months 1/2 cup 3 times a day 1 hour before taking the drugs, after meals.

As a control, group 4 was examined - 40 patients who received traditional therapy without the inclusion of immunomodulatory agents. All groups were identical in age, sex, and clinical forms of tuberculosis.

Hepatotropic, detoxification, hormonal, restorative therapy was widely used.

All patients underwent a comprehensive clinical, laboratory, immunological and biochemical examination.

To assess the immunogenetic status, the following were determined: T- and B-rosette-forming cells - E-POK and EAC-POK by the method of Jondal et al. (1972). The state of nonspecific reactivity was assessed by the intensity of phagocytosis, and specific anti-tuberculosis immunity was assessed by the reaction of blast-transformation of lymphocytes with tuberculin (RBTL with PPD) according to the method of V.Ya. Gergert (1970).

To clarify the severity of inflammation, the level of haptoglobin (Hp) was determined according to Koriner (1972), sialic acids according to the Hess method (V.S.Asatiani, 1969), and seromukoids by the colorimetric method (Kolb V.G., 1976).

**Results and discussion.** In the course of treatment, the study of the immunological status showed that in patients receiving hemalin, there was a tendency to an increase in E-ROC from 43 ± 2.5 to

46 ± 3.2% (N - 64 ± 1.6%), EAC-ROC - from 9 , 2 ± 0.8 to 10.7 ± 0.1% (N - 16.06 ± 0.56%), phagocytosis from 41.4 ± 0.24 to 43.7 ± 0.2% (N - 58 , 1 ± 1.1%).

Patients in group 2 who received the combination of hemalin + succession obtained the highest results over time: an increase in E-ROC - from 44 ± 1.6 to 54 ± 2.8%, EAS-ROC - from 9.0 ± 0.92 to 14.8 ± 0.22%, phagocytosis from 42.5 ± 0.33 to 50 ± 1.7% (Table 1). However, we did not observe complete normalization of immune status indicators in this group.

**Table 1**  
**Dynamics of immunological parameters**  
**in patients with LN who received different correction schemes**

| Patient group                          | E-ROCK%                                       | EAC-ROCK%                                      | Phagocytosis                                   |
|--|---|--|--|
| Group 1 - hemalin<br>n = 25            | $\frac{43 \pm 2,5}{46 \pm 3,2}$<br>P>0,05     | $\frac{9,2 \pm 0,8}{10,7 \pm 0,1}$<br>P>0,05   | $\frac{41,4 \pm 0,24}{43,7 \pm 0,2}$<br>P>0,05 |
| Group 2 - hemalin + sequence<br>n = 35 | $\frac{44 \pm 1,6}{54 \pm 2,8}$<br>P>0,05     | $\frac{9,0 \pm 0,92}{14,8 \pm 0,22}$<br>P>0,05 | $\frac{42,5 \pm 0,33}{50 \pm 1,7}$<br>P>0,05   |
| 3 group herbal collection<br>n = 25    | $\frac{45,1 \pm 1,3}{48,4 \pm 2,2}$<br>P>0,05 | $\frac{9,9 \pm 1,4}{11,2 \pm 1,8}$<br>P>0,05   | $\frac{40 \pm 1,4}{44 \pm 1,8}$<br>P>0,05      |
| 4 group control<br>n = 40              | $\frac{42 \pm 1,5}{45 \pm 2,8}$<br>P>0,05     | $\frac{9,1 \pm 1,2}{10,7 \pm 0,1}$<br>P>0,05   | $\frac{40,6 \pm 0,55}{43,7 \pm 0,2}$<br>P>0,05 |
| Healthy<br>n = 15                      | 64 ± 1,6                                      | 16 ± 0,6                                       | 58,1 ± 1,1                                     |

Note: in the numerator - indicators before treatment, in the denominator - after treatment;  
 P - significant difference before and after treatment.

In the group of patients who received additionally as an immunocorrector only an infusion of phyto-collection, no specific changes in the immunological status were noted during treatment.

It was found that in patients with LN who received additional hemalin, the level of sialic acids increased by 1.5-2.5 times up to 380 units. (N-160 units), the content of the glycoprotein haptoglobin increases 1.5-2 times to 140 mg% (N - 100 mg%), the level of seromuroid in patients also increases significantly to 300 ± 1.6 units. reduction of all biochemical parameters of inflammation: sialic acids up to 240 ± 1.55 units, seromuroids up to 210 ± 1.9 mg%, haptoglobin up to 100 ± 1.5 mg%. In the group of patients who received additional hemalin in combination with the infusion of the series, the following results were obtained: an increase in the level of sialic acids by 1.5-2.5 times up to 350 units. (N-160 units), the content of haptoglobin increases 1.5-2 times to 150 mg% (N - 100 mg%), the level of seromuroids in patients also significantly increases to 290 ± 1.96 units. In dynamics, there is a decrease in all biochemical indicators of inflammation: sialic acids up to 200 ± 1.72 units, seromuroids up to 180 ± 1.8 mg%, haptoglobin up to 90 ± 1.82 mg%.

In the group of patients who additionally received an infusion of medicinal herbs, the highest rates of the inflammatory complex were noted in the course of complex therapy: the activity of sialic acids was 290 ± 1.92 units, seromuroids - 270 ± 0.9 mg%, haptoglobin - 120 ± 2.0 mg%.

High biochemical parameters of inflammation and their insignificant dynamics were noted in the control group of patients.

Thus, the combination of hemalin with the infusion of the series, in comparison with other schemes, has a more pronounced anti-inflammatory effect, which is confirmed by changes in the activity of biochemical parameters of inflammation.

In  $63.2 \pm 8.8\%$  of patients who received hemalin and its combination with the infusion of a series at the end of 1 month of treatment, a pronounced positive dynamics of clinical symptoms was noted: reduction or disappearance of cough with sputum, normalization of body temperature, disappearance of sweating, appearance of appetite, weight gain body. At the same time, in other groups, positive dynamics was noted only by the end of 2-3 months of therapy.

Dynamic observations showed that, in the course of complex treatment, the highest smear conversion rates were noted in the group of patients who received additional immunocorrection with hemalin and its combination with an infusion of a series of  $72 \pm 9.4\%$  and  $83 \pm 6.3\%$ , respectively. In the group of patients who additionally received phyto-collection, the smear conversion by 2-3 months was  $56.0 \pm 9.9\%$ , while in the control group, the smear conversion was  $55 \pm 9.9\%$  (Table 2).

**Table 2**  
*The frequency of smear conversion in patients with LN who received different schemes of immune correction*

| Groups               | Patients with MBT + | Of these, MBT-                   | No dynamics                     |
|----------------------|---------------------|----------------------------------|---------------------------------|
| 1- Gemalin           | 25 (100%)           | 18 ( $72 \pm 9,0\%$ )<br>P>0,05  | 7 ( $28 \pm 9,0\%$ )<br>P>0,05  |
| 2 - Gemalin + cerada | 35 (100%)           | 2 ( $83,0 \pm 6,3\%$ )<br>P<0,05 | 6 ( $17 \pm 6,3\%$ )<br>P<0,05  |
| 3 - Phyto-collection | 25 (100%)           | 14 ( $56 \pm 9,9\%$ )<br>P>0,05  | 11 ( $44 \pm 9,9\%$ )<br>P>0,05 |
| 4 - Control          | 40 (100%)           | 22 ( $55 \pm 9,2\%$ )            | 18 ( $45 \pm 9,2\%$ )           |

Note: P - reliability compared with the control group.

Positive X-ray changes in dynamics were noted in the form of a decrease in the cavity and significant or partial resorption of infiltration, foci of dissemination (Table 3).

**Table 3**  
*X-ray dynamics in patients who received different schemes of immunocorrection*

| Groups               | Number of patients | Reducing the cavity               | Resorption of infiltration, foci of dissemination |
|----------------------|--------------------|-----------------------------------|---|
| 1- Gemalin           | 25                 | 12 ( $48 \pm 9,9\%$ )<br>P<0,05   | 6 ( $24 \pm 8,5\%$ )<br>P>0,5                     |
| 2 - Gemalin + cerada | 35                 | 19 ( $54,3 \pm 8,4\%$ )<br>P<0,05 | 16 ( $46 \pm 8,4\%$ )<br>P<0,01                   |
| 3 - Phyto-collection | 20                 | 9 ( $45 \pm 11,1\%$ )<br>P>0,1    | 7 ( $35 \pm 10,6\%$ )<br>P>0,05                   |
| 4 - Control          | 40                 | 10 ( $25 \pm 6,8\%$ )             | 6 ( $15 \pm 5,6\%$ )                              |

Note: P - reliability compared to the control group.

A decrease in the cavity was noted in the group of patients who received only hemalin as an immunocorrector in  $48 \pm 9.9\%$  and resorption of infiltration in  $24 \pm 8.5\%$  of cases. At the same time, in the group of patients treated with a combination of hemalin with an infusion of a series, a decrease in the cavity was noted in  $54.3 \pm 8.4\%$  and a significant resorption of infiltration in  $46 \pm 8.4\%$  of patients.

In patients with the presence of LN who received additional phyto-collection, a decrease in the cavity was noted in  $45 \pm 11.1\%$  and resorption of infiltration - in  $35 \pm 10.6\%$  of patients. The lowest rates

of treatment efficacy were noted in patients who received only complex therapy without immunocorrection.

The results of the studies have shown that patients with LN have a decrease in T- and B-lymphocytes and phagocytic activity of neutrophils. In order to correct the identified immunological parameters, three schemes for the use of immunomodulatory agents have been developed. It has been established that the combined use of hemalin + an immunophytopreparation of the series give the highest positive effect on the part of the immunological status in comparison with other groups. Apparently, a train that has an anti-inflammatory effect potentiates the action of hemalin, in addition, according to experimental data, the infusion of a train stimulates the formation of a humoral immune response, increases the production of T- and B-lymphocytes. The results obtained indicate the need to continue research in this area to optimize immunocorrection in tuberculosis patients with drug resistance.

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