

EFFICACY OF INTERMITTENT LOW-FREQUENCY ELECTROSTATIC FIELD IN THE SANATORIUM-BASED COMPLEX TREATMENT OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Yashkov A.V., M.D., Professor, Head of the Department of Physiotherapy, Balneotherapeutics and Rehabilitation, Samara State Medical University, Samara, **Gazdieva E.M.**, Chief Medical Doctor, Sanatorium “Nadezhda”, Honoured Doctor of Russia, **Badyanova I.S.**, Head of the Department of Physiotherapy, Sanatorium “Nadezhda”, “Tolyattiazot”, Tolyatti

Chronic Obstructive Pulmonary Disease (COPD) is one of the most prevalent diseases and it occurs as a result of air pollution, smoking and repeated infections (A.G.Chuchalin, S.I.Ovcharenko, 2004). According to official data from the Health Ministry of Russia, about 1 million patients suffer from COPD, while data from epidemiological studies suggests that the figure may exceed 11 million. COPD was ranked 12th in 1990, but by 2020 it is expected to be ranked 5th according to WHO and World Bank projections.

The problem of treating COPD patients in sanatorium conditions remains extremely relevant even today, considering its high prevalence, gravity of morbidity, mere short-term benefits offered by treatment, and the high burden of disability (I.E.Balaban, G.N.Ponomarenko, 2002). Many studies of COPD patients have addressed issues with the practicality of their treatment measures. Simultaneously, there is an ongoing search for better physical factors, which could further decelerate disease progression, as it leads to worsening bronchial obstruction and respiratory failure; and also, the quest for means to reduce the frequency and duration of precipitating episodes, to enhance the capacity for tolerance to physical stress and to improve the quality of life (Y.A.Osipov, L.S.Fedoseyeva, T.A.Larina, 2002).

In our study, we used the **Intermittent, Low-frequency Electro-Static Field (ILESF)** of the “HIVAMAT® 200” treatment device (“Physiomed”, Germany) in sanatorium conditions to ‘de-tension’, i.e. to release airway spasms, to remove phlegm / secretions and to ease breathing in COPD patients. The “HIVAMAT® 200” device was developed in the early 80s by German physiotherapists, Seidl and Walder. The unique feature of this procedure is the sagittal back-and-forth movement of the patient’s underlying tissue in its entire thickness (described by its German creators as “deep oscillation of tissues”). Recent studies have demonstrated the antispasmodic, anti-inflammatory and regenerative effects of manual procedures with the help of the “HIVAMAT® 200” device for various illnesses, including COPD.

The aim of the current study was to increase the treatment efficacy in COPD patients by developing a new treatment method, which included the use of Intermittent Low-frequency Electro-Static Field by applying the “HIVAMAT® 200” device.

The study was conducted with 110 COPD patients located in the “Tolyattiazot” Public Corporation’s “Nadezhda” sanatorium. The patients were divided into 2 groups by random selection. The treatment group comprised 80 COPD patients (58 males and 22 females) in the age-group 29 – 70 years (mean age 45.2 years). Patients were graded

on the basis of the severity of their disease, defined according to GOLD recommendations (2003). Among them, 52 patients were assessed to have grade 1 severity, whilst 28 had grade 2. Patients were admitted to the sanatorium in a state of stable remission and during the chronic phase. In addition to the standard rehabilitative therapy (phytotherapy, speleotherapy, inhalation, therapeutic physical exercises in the sports hall), patients in this group received a course of ILESF.

The control group, which did not receive ILESF therapy, comprised 30 COPD patients (18 males and 12 females) in the age group 28 – 72 years (mean age 50.33 years). 20 patients had grade 1 COPD and 10 had grade 2. Prior to their treatment, patients in both treatment and control groups had no other significant differences in terms of their basic clinical and functional parameters ($p > 0.005$).

Specific baseline preparations included evaluation of each COPD patient's clinical status, arterial blood pressure control by the Korotkov method using the Riva-Rochi device, Respiratory Function tests using the "SpiroTestRS" (Russian) machine, heart rate variation analysis using the "Ankar" (Russian) machine. Statistical analysis of the findings was conducted by standard methods of variational statistics, using parametric criteria.

Prior to the start of treatment, 92 patients, i.e. 83.06% of the observed COPD patients, complained of coughing during the day. Coughing with expectoration was present in 48 patients (43.06%) and breathlessness of varying degrees, in 91 patients (82.07%). Our assessment of their clinical picture at the end of treatment in the sanatorium showed improvement in the primary clinical manifestations of the disease in the majority of patients. In both patient groups there was a significant decrease in coughing, breathlessness and expectoration; also, mood elevation and normalization of sleep were observed. Patients in the treatment group showed a more marked improvement.

Analysis of the hemodynamics of the COPD patients revealed a tendency towards a rise in systolic and diastolic blood pressure. Inclusion of ILESF in the complex treatment of COPD patients led to a fall in both systolic and diastolic arterial blood pressure at the end of treatment; in particular, a significant decrease was seen in diastolic pressure, from 95.45 ± 7.26 mm Hg to 82.61 ± 6.86 mm Hg. Patients in the treatment group showed a definite reduction in heart rate, which indicates the transition to a more economical and effective functionality of the cardiac muscles. ILESF also had a favourable effect on the pulmonary function parameters. Thus, the values of FVC, FEV₁, FEV₁/VC in patients treated on the "HIVAMAT® 200" are indisputably higher in the treatment group as compared with the control group (Table 1).

The heart rate variation analysis revealed redistribution of the autonomic tone: there was a decrease in the mode amplitude (AM_0) and in the tension-time index (TI), which were associated with an improvement in autonomic reactivation indicators. The treatment group showed distinct dynamic changes (Table 2). This constitutes sufficient evidence to conclude that, with treatment using ILESF, there is an increase in the body's adaptation potential in COPD patients.

The COPD patients were followed up after treatment at the sanatorium. At the 6-months follow-up it was apparent that with the use of ILESF there was a deceleration

of disease progression (FVC 1 in 82.5% patients exceeded the initial values by 9.1%) and also a reduction in the bronchodilator intake as compared with the control group by a factor of 1.6.

Our study showed that ILESF impacts hemodynamics favourably, improves bronchial patency, normalizes the autonomic regulation of the cardio-respiratory system and slows down disease progression. Adding ILESF using the “HIVAMAT® 200” device, to the complex treatment of COPD patients in sanatorium conditions increases the efficacy of therapy.

Table 1. Impact of an intermittent low-frequency electro-static field on spirometry parameters in COPD patients (in % age of the ideal values)

Parameter	Treatment group (n=80)		Control group (n=30)	
	Before treatment	After treatment	Before treatment	After treatment
FVC	76.12 ± 12.86	88.73 ± 9.22*	73.78 ± 15.71	81.75 ± 9.78*
FEV1	66.85 ± 13.05	92.88 ± 17.83*	66.75 ± 11.05	84.73 ± 10.86*
FEV1/VC	79.93 ± 11.48	91.9 ± 10.17*	84.17 ± 11.57	88.58 ± 12.67

* - significant difference in comparison with values before treatment (p<0.05)

Table 2. Impact of an intermittent low-frequency electro-static field on heart rate variation parameters in patients with COPD

Parameter	Treatment group (n=80)		Control group (n=30)	
	Before treatment	After treatment	Before treatment	After treatment
M ₀ , sec	0.71 ± 0.01	0.95 ± 0.02**	0.72 ± 0.02	0.92 ± 0.004*
AM ₀ , %	57.54 ± 5.64	53.75 ± 5.64*	59.16 ± 6.67	57.21 ± 6.45
dX, sec	0.22 ± 0.01	0.31 ± 0.01*	0.25 ± 0.02	0.28 ± 0.01
ABI ¹ , SI Units	361.52 ± 24.46	270.45 ± 17.46*	378.56 ± 31.46	290.14 ± 19.24
IT, SI Units	254.59 ± 34.46	120.24 ± 9.64** ^o	262.89 ± 38.45	160.24 ± 10.43*

* - significant difference (* - p<0.05, ** - p<0.001) in comparison with values before treatment, o – significant difference (p<0.05) in comparison with values after treatment of patients in the control group

¹ Autonomic balance index

Original Article:

Яшков, А.В., Газдиева, Е.М., Бадьянова, И.С. (2007): Эффективность Переменного Низкочастотного Электростатического Поля в Комплексной Терапии Больных Хронической Обструктивной Болезнью Легких в Санаторных Условиях. Курортные ведомости 3 (42), 62-63.

Yashkov, A.V., Gazdieva, E.M., Badyanova, I.S. (2007): Efficacy of Intermittant Low-Frequency Electrostatic Field in the Sanatorium-based Complex Treatment of Patients with Chronic Obstructive Pulmonary Disease. Kurortniye Vedmosti 3 (42), 62-63.