Abstracts of Selected Publication on Halotherapy


Halotherapy (HT) is a method of treatment under conditions of artificial salt cave microclimate. Therapeutic effect is stipulated by aero dispersed medium saturated with dry sodium chloride aerosol containing the dominating amount of 2 to 5 micron particles. Particle density (1 - 5 mg/m³) varies depending on the type and stage of the disease. The other factors - comfortable humidified temperature regime, the hypo bacterial and allergen free environment saturated with aero ions enhance the therapeutic effect. Seventy-one patients (25M, 46F, average 39.1±2.4 years) with various types of asthma were treated by HT. The drug treatment of 60% patients did not give full effect. A control group of 15 patients (8M, 7F, average 38.4±1.5 years) received placebo. The HT course comprised of 10-20 daily one hour procedures. Treatment was conducted in a special room. No side effects were observed during the course of HT. The clinical state of 85% patients with mild and moderate and 75% patients with severe asthma improved after HT. Forty-seven percent of patients required fewer doses of drugs. The improvement in clinical state of patients was accompanied by positive dynamics in lung function tests. The changes in control group parameters after HT were not statistically significant. Thus, the results of HT application demonstrated its efficacy.


Halotherapy - the treatment under conditions of artificially created salt-cave microclimate. Therapeutic influence is stipulated by aero dispersed medium saturated with dry sodium chloride aerosol containing the dominating amount of 2 to 5 micron particles. Further development of the method is offered by the application of the controlled therapeutic microclimate in a halochamber. Particles density from 1 to 7 mg/m³ was used. On the basis of various parameters of aero disperse environments using, we have developed criteria of prescribing the treatment with due regard for nosological forms of respiratory diseases, their pathogen city variants, and the degree of obstructive impairment. Differential approach to the prescription of method allowed reducing the frequency and manifestations of undesirable bronchospastic reactions during treatment. The feasibility of using halotherapy to treat otorhinolaryngologic diseases was substantiated. At the same time, it has been established that further research is needed to verify the prescription of method for certain forms of respiratory diseases. Therefore, the application of controlled therapeutic microclimate of a halochamber improved the method of halotherapy and brought it nearer to the up-to-date medical technology.


Halotherapy (HT) - is mode of treatment in a controlled air medium which simulates a natural salt cave microclimate. The main curative factor is dry sodium chloride aerosol with particles of 2 to 5 mkm in size. Particles density (0.5-7 mg/m³) varies with the type of the disease. Other factors are comfortable temperature- humidity regime, the hypo bacterial and allergen- free air environment saturated with aero ions. 106 patients (pts) (59- with allergic, 27- with nonallergic bronchial asthma (BA) and 20 - with allergic rhinitis) were treated by HT. 15 pts of the control group was given placebo. HT course consisted of 10-20 daily procedures of 1 hour. The clinical state of 85% pts with BA and 90% - with allergic rhinitis improved after HT. The results of HT did not depend on BA type. The positive dynamics of flow-volume loop parameters and decrease of bronchial and nasal resistance measured by bodyplethysmography were observed. FVC and FEV₁ initial values and the values of their changes during HT showed a significantly negative correlation - the more marked was bronchial obstruction, the better were the results of

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therapy. The changes in control group parameters after HT were not statistically significant. The results of HT application demonstrated its efficacy.


The effect of dry sodium chloride aerosol (DSCA) was evaluated in 125 patients (pts) with bronchial asthma (44 M, 81 F, mean age 34.3±2.5 years). 60% of pts received a base medication without full effect. The control group of 15 pts (8M, 7F, mean age 38.4±1.5 years) received placebo. Treatment was performed in a special room with salt coated walls. The pts breathed quietly while reclining in chairs. DSCA containing the dominating amount of 2 to 5 mkm particles was produced by special nebulizer. The aerosol mass concentration (from 0.5 to 5 mg/m³) was prescribed according to the type of the disease. The DSCA course comprised 10-20 daily one hour procedures. Clinical symptoms analysis demonstrated that the number of asthma attacks decreased significantly. The cases with cough occurred more rarely, cough became easier and more productive. Reduction in bronchodilators and inhaled corticosteroid consumption was an indicator of clinical benefit. The pts showed significant increase of FVC, FEV1, PEF, FEF50 and decrease of Raw by the end of the treatment. The changes in control group parameters after placebo were not statistically significant. The pts were examined 6 and 12 months after the DSCA course. The average duration of remission was 7.6±0.9 months.


17 patients with common cold underwent dry rock salt aerosol (DRSA) therapy. DRSA with particles size of 1-5 mkm and high negative charge is the main curative factor of Halotherapy (HT). Density of aerosol depends on nosology, clinical features and FEV₁ (0.5-1; 1-2; 3-5; 7-9 mg/m³). HT is drug-free method, which simulates natural salt cave microclimate. There were two ways of DRSA administration: in the room with the controlled air medium which is created with special equipment; the inhalation through nasal mask of individual inhalator. The method of HT was sanctioned by the Russian Ministry of Public Health in 1990. It has been known that DRSA improves rheological properties of the airways contents, decreases edema of bronchial and nasal mucosa, it has a bactericidal action, enhances functioning of alveolar macrophages. Other factors are comfortable temperature and humidity, hypo bacterial and allergen free air medium. The common cold patients’ condition was assessed by daily clinical observation, functional and citobacteriological tests. In all cases we registered cold clinical symptoms disappear faster than in control group. The improvement in clinical state was accompanied by positive dynamics of laboratory tests.


Halotherapy (HT) is a drug-free method which simulates natural salt cave microclimate. The controlled air medium is created in ordinary room with special equipment. The main curative factor- is a dry sodium chloride aerosol with density of 0.5 to 5 mg/m³, particles size of 1-5 mkm and high negative charge. Sodium chloride aerosol improves rheological properties of the bronchial contents, decreases edema of bronchial mucosa, it has an bactericidal action, enhances functioning of alveolar macrophages. Other factors are comfortable temperature and humidity, hypobacterial and allergen free air medium.

The method of HT was sanctioned by the Ministry of Public Health in 1990. To study the efficiency of HT the data were collected from 15 Russia and 2 Lithuania hospitals. We have evaluated the results of HT in 3239 adults and children with various type of asthma (2320-from Russia, 919- from Lithuania). The HT results were assessed by physicians on the basis of clinical symptoms and functional parameters dynamics. The course of HT (12-21 daily
Halotherapy (HT) is a mode of inhalation therapy with dry sodium chloride aerosol. The controlled air medium is created in an ordinary room with special equipment. The main curative factor is a dry sodium chloride aerosol with particles size of 1-5 mkm and high negative charge. Density of aerosol depends on nosology, clinical features and FEV1 (0.5-1; 1-2; 3-5; 7-9 mg/m³). Other factors are comfortable temperature and humidity, hypo bacterial and allergen free air medium. The method of HT was sanctioned by the Russian Ministry of Public Health in 1990. To study the efficiency of HT the data were collected from 15 Russia hospitals (during 1991-1994 years). We have evaluated the results of HT in 4780 adults and children with various types of pulmonary diseases. HT course consisted of 10-20 daily procedures of 1 hour. The HT results were assessed by physicians on the basis of clinical symptoms, functional parameters and the dosage of medication dynamics with the standard questionnaires use. HT resulted in improvement of clinical state in 85% of mild and moderate asthma cases, 75% - of severe asthma cases and 97% - of chronic bronchitis and bronchiectasis. Long-term examination of patients (for one or more year) demonstrated the effect of HT on reduction in the frequency of exacerbations, reduction in chronic symptoms. Thus, HT can be used as a rehabilitation method in asthma management.


Halotherapy (HT) is a mode of inhalation therapy with dry sodium chloride aerosol. The controlled air medium is created in an ordinary room with special equipment. The main curative factor is a dry sodium chloride aerosol with particles size of 1-5 mkm and high negative charge. Density of aerosol depends on nosology, clinical features and FEV1 (0.5-1; 1-2; 3-5; 7-9 mg/m³). Other factors are comfortable temperature and humidity, hypo bacterial and allergen free air medium. The method of HT was sanctioned by the Russian Ministry of Public Health in 1990. To study the efficiency of HT the data were collected from 15 Russia hospitals (during 1991-1994 years). We have evaluated the results of HT in 4780 adults and children with various types of pulmonary diseases. HT course consisted of 10-20 daily procedures of 1 hour. The HT results were assessed by physicians on the basis of clinical symptoms, functional parameters and the dosage of medication dynamics with the standard questionnaires use. HT resulted in improvement of clinical state in 85% of mild and moderate asthma cases, 75% - of severe asthma cases and 97% - of chronic bronchitis and bronchiectasis. Long-term examination of patients (for one or more year) demonstrated the effect of HT on reduction in the frequency of exacerbations, reduction in chronic symptoms. Thus, HT can be used as a rehabilitation method in pulmonary diseases management.


Aim: Assessment of the efficacy of dry high-dispersive aerosol of sodium chloride-the main acting factor of haloaerosol therapy-on defense system of the respiratory tract.

Material and methods: 188 patients with respiratory disease and at risk of pulmonary pathology received course of haloaerosol therapy. 49 matched patients were given placebo. The effect of the treatment was assessed by clinical, endoscope picture, cytomorphological and bacteriological characteristics of the bronchoalveolar lavage, contamination activity of the microflora, activity of local humoral immunity in pharyngeal brush-biopsies and saliva, rheological indices of the sputum.

Results: Dry aerosol of sodium chloride demonstrated anti-inflammatory activity in the respiratory tract, mucous regulatory action. It enhances drainage of the bronchi, activates alveolar macrophages, and improves biocenosis and local humoral immunity.

Conclusion: Haloaerosol therapy has positive effect on the host defense system, improves functions of the respiratory tracts.


In the scientific review the method of halotherapy simulating the parameters of salt spelaean clinic microclimate is described. The data with regard to the development of method, principles and advantages of halotherapy with a controlled microclimate of halochambers and
haloinhalation therapy with portable haloinhalator are presented. Operative factors, pathophysiological foundations of curative action of this method, particularities of symptom dynamics within the treatment course and factors of clinical pattern change with different pathologies are analyzed. Data of clinical efficiency and substantiation of method application for rehabilitation treatment in patients with bronchopulmonary pathology as a method of primary and secondary prevention of respiratory diseases for ENT and skin diseases as well as in persons with concomitant cardiac pathology were presented.


Nowadays development of techniques for treatment and rehabilitation of children who have frequent and long-lasting colds is quite actual. 60 children with the discussed pathology have been examined and divided into three groups. A comparative analysis of the effectiveness of rehabilitation has been done. In one group a rehabilitation course included curative physical trainings, massage, swimming pool; in the other group - the same plus halotherapy; in the third group - everything mentioned above plus breathing gymnastics. Efficiency was evaluated by the function of external breathing. Results have shown that halotherapy improves parameters of the external breathing. Additional use of special equipment for breathing gymnastics considerably improves the efficiency of the prescribed therapy.


Dry fine sodium chloride aerosol (haloaerosol) is the main factor of Halotherapy. The goal was to study therapeutical effects of haloaerosol on the functional state of airway mucosa as well as on vitality and biological properties of microorganisms.

We used the standard S. pneumoniae strain as a test culture, which properties were studied in an experimental haloaerosol chamber. Properties of the respiratory tract epithelium were studied using a model of larynx-pharyngeal epithelium cells obtained from 10 healthy persons before and after haloaerosol inhalation. As the control substance, an aerosol of physiologic saline was used. Electrokinetic activity (EC) of epithelial cells and adhesive activity (adhesion index - AI) of S. pneumoniae were evaluated.

During stay of S. pneumoniae strain in haloaerosol chamber the colony-forming units (CFU) parameter was reduced with increasing of exposition period from 5 to 30 minutes (p<0,001). The survived microorganisms had decreased virulence and hyaluronidase activity.

After haloinhalations an increase of the EC of the epithelial cells in the healthy persons was observed (before - 27,0±4,7%, after - 47,0±1,6%; p<0,01) as well as a decrease of AI in comparison with the initial one (29,3±4,3% и 8,3± 4,1% correspondingly, p<0,01). The study indicated the adhesive activity of S. pneumoniae was the least intensive at high level of EC cells (r=1,0).

As a result, it has been established that dry fine sodium chloride aerosol produces an inhibitory effect on growth and vital capability of microorganisms and changes their biological properties. Under the influence of haloaerosol an increase of the electrophysiological functional activity of the respiratory epithelial cells was observed as well as a rise of their colonizational resistance.

Dry sodium chloride aerosol (DSCA) could be used as a method of respiratory hygiene for prevention of COPD. The aim was to study clinical and functional parameters of the persons with COPD risk on application of the DSCA.

54 persons (prs) with exogenous risk factors of COPD were examined. They had the productive cough associated with smoking and/or exposure to industrial pollutants. The main group (MG) (26 male, 8 female, 43±2,4 yrs) was treated with the DSCA (14 procedures). Procedures (10 min daily) were given using inhaler Haloneb®, producing DSCA with particles size of 1-5 µm and 0,8-1,2 mg/min density. The control group (CG) (15 male, 5 female, 46,5±2,8 yrs) received inhalation with room air.

After the procedures the cough retained in 27% of the persons of MG and 91% - CG (p<0,001). Relief of cough and improvement of sputum properties were remarked in the 88% of MG and 22% - CG (p<0,05). The significant decrease of the number prs with dry rales (15%-MG, 55%-CG, p<0,05) was observed as well. Significant increase of parameters FEF25 (p<0,05), FEF50 (p<0,01) FEF75 (p<0,05) was marked in MG. There were no significant changes of the volume indexes in 16 prs (47%) of MG was observed. That differed significantly from CG values (5%, p<0,01).

Respiratory symptoms and functional parameters of the prs with risk of COPD had the significant changes under the action of DSCA. Relief of the cough, improvement of the sputum properties, positive dynamics of auscultative finding and functional parameters demonstrated stimulation of bronchial drainage and sanitary acting of the DSCA.


The purpose: To estimate efficiency of halotherapy, physical training, massage at children with moderate bronchial asthma (BA). Methods: The open randomized comparative study lasted 4 months. Base antiasthmatic therapy was carried out with combined medicine seretid (50 mcg salmeterol and 100 mcg fluticasone). Three groups were generated: 30 patients, received only the basic therapy, the other two groups, each of 32 of children, except this, received for 2 weeks: 2-nd group physical training and massage, 3-rd group halotherapy. The average age in the groups was accordingly: 9,5±0,5; 9,4±0,5; 9,5±0,3. The daytime and night displays of BA were estimated by scale from 0 up to 3 numbers. Results: The daytime and night symptoms were accordingly: 0,30±0,03 and 0,33±0,03 (seretid group), 0,27±0,04 and 0,11±0,02 (seretid + phisical training+massage group), 0,16±0,04 and 0,15±0,04 (seretid+halotherapy group), p < 0,05. Peak expiratory flow was higher in seretid+halotherapy group (352±8 morning and 354±8 ml evening) and seretid+physical training+massage: (347±3 morning and 347±3 ml evening), against 327±4 (morning) and 330±4 ml (evening) in seretid group (p<0,05). The numbers of inhalations of salbutamol as needed were minimal per day in seretid+halotherapy group: 0,03±0,02, against 0,20±0,04 in seretid+physical training+massage group and 0,39±0,04 in seretid group, (p<0,05). Conclusion: The application of halotherapy as well as physical training and massage on the background of the basic medicinal therapy in children with moderate BA renders to positive effect.


The elaboration of the long-term programs of the COPD control is an important direction in the improvement of patients quality of life. The programs offered by us include rational bronchodilator therapy in combination with non-medicamental methods of treatment. One of such methods is speleotherapy (the treatment in of the rock salt mines microclimate) and its artificial analogues (halotherapy). The rock salt aerosols improve the mucocellular clearance,
they have antibacterial and anti-inflammatory influence and thus promote the reduction of bronchoobstruction.

123 patients with COPD of different stages have been investigated. The patients underwent complex examination, which included the research of pulmonary function tests (PFT), inflammatory activity, immune reactivity, estimation of lipids peroxidation (POL) and antioxidant defence (AOD). The decrease of some unspecific defence factors, CD3- and CD4-cells independently of COPD stage was determined. But the number of B-lymphocytes, CD25- and CD71-cells was increased. The POL activation, and AOD decrease have been observed. Two halotherapy regimes (HR) with different aerosol characteristics were used. The special laser-optical system for monitoring of aerosol characteristics was carried out. Halotherapy has positive influence on clinical COPD process, but significant increase of PFT-data and improvement of some immune indexes were found out only after HR-2. The improvement of AOD-data were observed after both HR. Besides that the rise of sensitivity to bronchodilatator therapy was noted.

15. Chervinskaya A.V., Biskys V. Aerosol respiratory hygiene as a main part of prevention of chronic obstructive pulmonary diseases (COPD) and health promotion for patients in hospitals // 14th International Conference on Health Promoting Hospitals, Palanga, Lithuania, May, 2006, II-5.3.

The experts of WHO forecast the subsequent increase of COPD and asthma on worldwide. Mainly it has been related to deteriorative ecologic situation. To stop this tendency aerosol methods with physical factors are preferable because of physiological action without system side effects. Dry salt inhalation therapy has a long history in Europe since 19-th century. Nowadays there are a number of resorts are exploiting salt caves for patients with pulmonary diseases. Halotherapy (HT) is the result of adapting natural salt aerosol from salt caves to flexible usage in other locations. In addition to availability the ability to deliver a specified varied dose of dry rack salt represents a major advantage of HT over the treatment in natural salt caves. Over 15 years, numerous expert groups have worked on standardization of halochambers based on exact understanding of condition in salt caves. HT was sanctioned by Ministry of Public Health in Russia and Lithuania.

The efficiency of HT for care of respiratory and allergic diseases, ENT-pathologies was proved by many scientists in controlled studies. The inclusion of HT into the rehabilitation course of pulmonary pathology patients (with asthma, COPD, bronchitis, pneumonia and others) allows achieving therapeutic effect by 82–95% of cases along with the most optimal use of pharmacotherapy. It has shown that the application of the HT assured 1,5-2 times reduction of morbidity level in long term observation.

Dry sodium chloride aerosol has positive effect on the defense system of the respiratory tracts. It enhances mucociliary clearance in conjunction with normalization of bronchial microflora and immunological benefits. Data from prevention studies showed strong efficacy of dry salt aerosol in reducing the risk of common cold during cold season. HT may be recommended to healthy persons and patients with chronic respiratory diseases prior to or during every cold season. Evaluation of respiratory symptoms, functional parameters, local immunity in persons with risk factor of lung diseases, confirmed their significant changes under the action of HT. It can use as a sanitary method for respiratory airways.

We look at positioning of dry sodium chloride aerosol with HT as a main component of respiratory hygiene for prevention of respiratory diseases, relief of environment hazards and rehabilitation of chronic patients. As a consequence of clinical and mechanism acting understanding of HT, the concept of “maintaining bronchial health” appears to be helpful in health promotion activity of hospitals.

WHO forecasts the subsequent increase of lung diseases worldwide, related to deteriorative ecological situation. To stop this tendency aerosol methods with physical factors are preferable. Adapting natural salt aerosol from salt caves for flexible and comfortable usage has lead to Halotherapy and HaloSpa technology with dry sodium chloride aerosol (DSCA).

The aim of the study: Evaluation of the efficacy of DSCA on defense system of the respiratory tract and clinical state of the patients with respiratory diseases. 193 patients with pulmonary diseases and at risk of them received a course of DSCA (10–20 sessions daily 45-60 min each in the rooms, equipped with dry salt aerosol generators). 67 matched patients were given a placebo. The effect of the treatment was evaluated by clinical, functional, cytomorphological, bacteriological, immunological examinations, rheological indices of the sputum.

Results: DSCA enhanced drainage of the bronchi, activated alveolar macrophages, improved biocenosis and local humoral immunity. Procedures resulted in improvement of clinical state in 85% of mild and moderate asthma cases, 75% - of severe asthma cases and 97% - of chronic bronchitis and bronchiectasis. The number of common cold cases during the cold season was reduced in half. Evaluation of respiratory symptoms and functional parameters by persons with risk factor of lung diseases confirmed their significant changes under the action of DSCA.

Conclusion. We look at positioning of DSCA as a main component of respiratory hygiene in Health Resort Medicine for prevention of respiratory diseases, as a relief of environment hazards and rehabilitation of chronic patients.


The aim was to study influence of dry sodium chloride aerosol (DSCA) on the respiratory tract of tobacco smokers. 47 male were examined. They had the productive cough as associated with smoking. The test group (TG) (24 male, 49,9±1,2 yrs; 27,0±1,7 pack/years) was treated with the DSCA (14 procedures). 20 procedures (10 min daily) were given using inhaler Haloneb, producing DSCA with particles size of 1-5 µm and 0,5 mg/min density. The placebo group (PG) (23 male, 49,5±1,5 yrs; 27,9±2,3 pack/years) received inhalations with plain air. 88% of smokers of TG by the end of inhalation course reported easier and/or decreased cough, changes in the character of sputum, which became lighter and clearer. Improvement in the character of sputum was noted only 22% volunteers of PG (p<0,001).

Cytobacteriologic study of brush bioplates taken from pharyngeal mucosa was carried out before and after procedures in the both groups. It was determined that the infection index (II - % of epitheliocytes with adhered cells of S. pneumoniae) and adhesion index (AI - the mean number of microbial cells per one epitheliocyte) decreased significantly in the TG (II before – 28,1±5,8 and after – 7,8±2,7%, p<0,01; IA before - 45,4±11,3 and after - 13,9±6,3 microbe cells, p<0,01). The amount of IgA in epithelial cells of the oropharyngeal micosa (estimated by indirect method of fluorescent antibodies) increased significantly in the TG (before - 1,5±0,9 and after - 2,0±0,5, p<0,05). There were no significant changes at these indexes in the PG.

Conclusion. DSCA relieves the main symptoms (character of cough and sputum), improves local defense mechanisms and resistance of mucous membranes of tobacco smokers owing to decreased colonization activity of pathogenic microgerm.


The review presents the method of halotherapy which models the microclimate parameters of salt speleoclinics. It gives historical data on the method development, principles and advantages of halotherapy by means of controlled microclimate. The influence of the main curing factor – the dry fine-grained sodium chloride aerosol, and pathophysiological basis of curing effect of the halotherapy method are under review in the article. The article describes the method of
controlled halotherapy and its technology, that is the halocomplex equipped with a controlled halogenerator.

Data on clinical efficacy and the grounds for the method usage in the recovering treatment for bronchopulmonary and otorhinolaryngologic pathologies, skin diseases and combined cardiovascular pathology, as well as preventive measures against respiratory diseases are cited. Efficacy of halotherapy in treatment and recovery of children is under review. Foundations for perspective usage of halotherapy in all kinds of medical and recovering establishments are given.

**Key words:** halotherapy, speleotherapy, drug free method, salt room, salt cave, salt chamber, halochamber, halocomplex, halogenerator, dry sodium chloride aerosol, respiratory diseases.


**Introduction:** Dry sodium chloride aerosol is the main curative factor of treatment in the natural salt caves - speleotherapy. Halotherapy (HT) has been developed on the basis of speleotherapy. Curative effect of HT is caused by an air medium saturated with dry sodium chloride aerosol with predominance amount of particles of 1 to 5 mkm in size and of a certain density range. HT is carried out in the premises equipped with medical facilities – dry salt aerosol generators and control devices.

It has been known, that nebulized sodium chloride solution is used with therapeutic and diagnostic purposes. There is a little doubt that inhalation of isotonic saline does not produce any evident therapeutic effects. Aerosolized hypertonic saline influences on of impaired mucociliary clearance but it is not used for therapy, because can provoke bronchospasm in patients with asthma and even in healthy persons. Generally, hypertonic and hypotonic solutions are used to diagnose bronchial hyper reactivity. Due to the fact that physical properties of dry sodium chloride differ from nebulized solution, its therapeutic effect differs as well.

**The aim:** assessment of the efficacy of the dry fine sodium chloride aerosol (haloaerosol) on defense system of the respiratory tract and clinical state of the patients with respiratory diseases.

**Material and methods:** 193 patients with respiratory disease and at risk of pulmonary pathology received course of HT. 67 matched patients were given placebo. The effect of the treatment was assessed by clinical and functional parameters dynamics, endoscope picture, cytomorphological and bacteriological characteristics of the bronchoalveolar lavage, contamination activity of the microflora, activity of local humoral immunity in pharyngeal brush-biopsies and saliva, rheological indices of the sputum. The course of HT was consisted of 10-20 daily 1 hour procedures.

**Results:** It has been established that dry fine sodium chloride aerosol produces an inhibitory effect on growth and vital capability of microorganisms and changes their biological properties. Under the influence of dry salt aerosol an increase of the electrophysiological functional activity of the respiratory epithelial cells was observed as well as a rise of their colonizational resistance. Dry aerosol of sodium chloride demonstrated anti-inflammatory activity in the respiratory tract, mucoregulating action. It enhances drainage of the bronchi, activates alveolar macrophages, and improves biocenosis and local humoral immunity. HT resulted in improvement of clinical state in 85% of mild and moderate asthma cases, 75% -of severe asthma cases and 97% - of chronic bronchitis and bronchiectasis. Patients showed positive dynamics of symptoms indicative of a better drain function of their airways. In the majority of cases the number and intensity of asthma attacks decreased, which allowed reducing the dosage of medication. The improvement in clinical state was accompanied by positive dynamics of the lung function measurements. None of the pts complained of bad condition during HT procedures. Long-term examination of patients (for one or more year) demonstrated the effect of HT on reduction in the frequency of exacerbations, reduction in chronic symptoms. The changes in control group parameters after placebo were not statistically significant.

Evaluation of respiratory symptoms and functional parameters in persons with risk factor of COPD confirmed their significant changes under the action of HT. Relief of the cough in combination with improvement of sputum properties, positive dynamics of auscultative finding
and functional parameters demonstrated stimulation of bronchial drainage and sanitary acting of HT.

**Conclusion:** Dry sodium chloride aerosol has positive effect on the defense system and function status of the respiratory tracts. Clinical efficacy of HT in prophylaxis and rehabilitation of respiratory patients is based on the medicating action of dry sodium chloride aerosol.


The paper presents the method of halotherapy which models the microclimate parameters of salt speleoclinics. It gives historical data on the method development, principles and advantages of halotherapy by means of controlled microclimate. The influence of the main curing factor — the dry fine-grained sodium chloride aerosol, and pathophysiological basis of curing effect of the halotherapy method are under review in the paper. The paper describes the method of controlled halotherapy and its technology, that is the halocomplex equipped with a controlled halogenerator. Scientific grounds for action mechanism, proven clinical efficiency verified by research on standards of evidence-based medicine and practical application in various fields of public health determine broad prospect of the method in rehabilitation, sanatoria and health resorts and preventive medicine. Data on clinical efficacy and the grounds for the method usage in the recovering treatment for bronchopulmonary and otorhinolaryngologic pathologies, skin diseases and combined cardiovascular pathology, as well as preventive measures against respiratory diseases are cited. Efficacy of halotherapy in treatment and recovery of children is under review. Foundations for perspective usage of halotherapy in all kinds of medical and recovering establishments are given.


**Aim of the study.** The main objective was to estimate the preventing efficacy of inhaled dry sodium chloride aerosol (DSCA) against acute respiratory viral infection (ARVI).

**Objects and methods.** 160 persons were recruited from personnel of an industrial enterprise through special questionnaire. They were randomized in 2 groups - test group (TG) (19 male, 61 female, 47.4±8.0 yrs) and control group (CG) (22 male, 58 female, 48.8±11.6 yrs). The persons of the TG were undertaken with inhalations (10 min) using Haloneb® inhaler, producing DSCA with particles size of 1-5 μm and 0.8-1.2 mg/min density flow. The CG received 10 min inhalations with plain air. Each subject was given 2 inhalations a week during 12 weeks. A physician regularly examined the subjects of the both groups for possible ARVI.

**Results.** For three months observation there were only 14 cases of ARVI and 104 days marked by symptoms of ARVI in the TG. In the CG there were 55 cases of ARVI and 585 days of symptoms. TG subjects were affected by ARVI four times less frequently than CG subjects, and the number of days marked by symptoms of ARVI was 5.6 times less. Analysis of incidences of ARVI showed that they occurred in 60% of subjects with risk factors of COPD in CG subjects against 18% of subjects with risk factors in the TG (p<0.01). On the whole, 13 subjects (16%) developed ARVI in the TG against 50 subjects (63%) in the CG (p<0.001).

**Conclusions.** Inhalations of DSCA, consisting of two weekly procedures for 12 weeks are an effective preventing measure against ARVI.


(Червинская А.В., Кветная А.С., Корженевская Т.Б. Влияние сухого высокодисперсного аэрозоля хлорида натрия на физиологические свойства Streptococcus Pneumoniae, перистирующего на слизистой ларингофарингеального эпителия, в эксперименте //Научно-практический журнал "Клинико-лабораторный консилиум". - 2009. - №3 (28). - С.72-77.)

**Background.** The dry aerosol of sodium chloride with a predominant fraction of
respirable particles is the main factor of action of the inhalation therapy which was given the name of halotherapy. The goal of this work was to study effects of the dry, fine-grained sodium chloride aerosol on the functional state of mucosal epithelium as well as on vital capability and biological properties of microorganisms.

**Methods.** As a test culture, we used the standard S. pneumoniae strain, whose properties were studied in an experimental aerosol chamber. Properties of the respiratory tract epithelium were studied using a model of pharyngeal epithelium cells obtained from 10 healthy volunteers before and after inhalation of the dry sodium chloride aerosol. As a control, an aerosol of 0.9% sodium chloride solution was used.

**Results.** It has been established that the dry, fine-grained sodium chloride aerosol produces an inhibitory effect on growth and vital capability of microorganisms and changes their biological properties. After exposition to the aerosol there was observed an increase of the electrophysiological functional activity of the epithelial cells and a rise of their colonizational resistance.

**Keywords.** Dry sodium chloride aerosol, inhalations, halotherapy, respiratory diseases, microorganisms, mucosa epithelium.


Treatment in natural salt caves (spleotherapy) has been known for years. In Poland, numerous artificial salt caves have been constructed during the last few years that were supposed to be a good alternative for natural salt chambers. Still, in artificial caves it was impossible to reach such levels of salt aerosol that would bring medical effect. Consequently, they cannot be treated as "medical equipment." However, artificial salt caves can be used in medical treatment provided that special salt aerosol demonstrating certain medical parameters is introduced.

The aim of the research was to examine physical and chemical properties of high-dispersive salt dry aerosol of certain concentration that is produced by a generator. The microclimate of the caves was checked together with the size of aerosol particles and its concentration. This investigation, treated as primary work, enabled to select the salt that has the greatest medical value to be a source of aerosol produced by the nebulizer that is additionally enriched with iodine. The examination of the size of particles generated by the apparatus showed that 98 percent of aerosol particles are 1-5 μm making them reach to pulmonary alveoli. Concentration of aerosol was examined in various conditions and places within the cave. It was 4.42-6.03 NaCl mg/m³ on average. It was stated that sodium chloride absorption during one procedure came to 13 mg NaCl on average, which means it was very small amount of salt that was absorbed by human organism. Yet, it should be speculated that such amount of sodium chloride does not have any negative influence on the patient. Examination of the microclimate of artificial caves shows that dry salt aerosol concentration came to 10-15 mg/m³, humidity - to 60 percent, air temperature - to 20-24 degrees Celsius, procedure duration - 45 minutes. These results we will be later adopted in treatment of patients with COPD.

**Key words:** salt caves, concentration of aerosol.

**Introduction.** The experts of WHO forecast the subsequent increase of allergy and asthma on worldwide. Mainly it has been related to deteriorative ecologic situation. To stop this tendency aerosol methods with physical factors are preferable because of physiological action without system side effects.

Dry salt inhalation therapy has a long history in Europe since 19-th century. Nowadays there are a number of resorts are exploiting salt caves for patients with pulmonary diseases. Halotherapy (HT) is the result of adapting natural salt aerosol from salt caves to flexible usage in other locations. Curative effect of HT is caused by an air medium saturated with dry sodium chloride aerosol (DSCA) with predominance amount of particles of 1 to 5 µm in size and of a certain density range. HT is carried out in the premises equipped with medical facilities - dry salt aerosol generators (halogenerators) and control devices.

Over 15 years, numerous expert groups have worked on standardization of halochambers based on exact understanding of condition in salt caves. In addition to availability the ability to deliver a specified varied dose of DSCA represents a major advantage of HT over the treatment in natural salt caves. HT was sanctioned by Ministry of Public Health in Russia and Lithuania.

**Material and methods.** The randomized placebo study has lasted for 12 months. Controlled HT was evaluated in 115 patients (pts) with asthma (37 males, 78 females, mean age 41.2±2.2 years). 60% of pts received a base medication without a full effect. DSCA with the dominating amount of 1 to 5 µm particles was produced by halogenerator ASA-01.3 (Aeromed Ltd.). Treatment was performed in a special room with salt coated walls. The pts breathed quietly while reclining in the chairs. The DSCA course comprised 15 -20 daily one hour procedures. The duration of each course and density of aerosol medium (from 1 to 5 mg/m3) depend on clinical features of asthma and functional parameters. The control matched group of 95 pts (30 males, 65 females, mean age 39.4±1.5 years) received placebo. Placebo course consisted of 15 procedures of musical psycho suggestive program in the same room with salt coated walls but DSCA was not produced by halogenerator.

**Results.** During HT the most of pts showed positive dynamics of symptoms indicative of a better drain function of their airways: sputum secretion alleviated, it became less viscous and more mucousal, coughing relieved, and the auscultative picture of the lungs altered. By the end of the course of HT the number of asthma attacks decreased significantly as compared to the initial ones (94 and 56%, p<0.01). The number of severe asthma attacks controlled by combined medication also decreased (24% and 3%, p<0.01). After HT inhaled corticosteroids were discontinued in 5% of pts. In 40% of pts it was possible to reduce the dose. Those were the cases when inhaled corticosteroids were prescribed as antinflammatory agents. Dynamics of beta-agonists usage was positive as well. Reduction or cancellation in medication usage was an indicator of HT clinical benefit. None of the pts complained of bad condition during HT procedures. The pts showed significant increase of FVC, FEV₁, PEF, FEF50 and decrease of Raw by the end of the treatment. HT resulted in improvement of clinical state in 85% of mild and moderate asthma cases, 75% -of severe asthma cases. The pts were examined 6 and 12 months after HT course. The average duration of remission was 7.6±0.9 months. The inclusion of HT into the rehabilitation course of asthma pts allowed achieving therapeutic effect by 82–95% of cases along with the most optimal use of pharmacotherapy. It has shown that the application of the HT assured 1,5-2 times reduction of morbidity level in long term observation. The changes of the majority of the clinical and functional parameters in the control group were less statistically as compared to the HT group’s ones.

**Conclusion.** The application of HT on the background of the basic medicinal therapy in pts with asthma renders to positive influence on the clinical and lung functional parameters. The results of HT application demonstrate its efficacy.

We look at positioning of dry sodium chloride aerosol with controlled HT as a component of rehabilitation programs for asthma pts.

Aim of the study. The main objective was to estimate the efficacy of inhaled dry sodium chloride aerosol (DSCA) in rehabilitation therapy (RT) of patients with COPD. Objects and methods. It was double-blind placebo study. 72 patients (pts) with moderate and mild stage of COPD were recruited. They were randomized in 2 groups - interventional group (IG) (21 m, 18 f, 60.3±10.8 yrs) and control group (CG) (22 m, 11 f, 58.5±8.9 yrs). All patients received RT: daily procedures of chest massage, light radiation, physical exercises. Pts of IG were treated with the DSCA (45 min twice a day for 14 days). DSCA containing particles with size of 1-5 μm and level of mass concentration in the room of 10-15 mg/m³ was produced by halogenerator GDA-01.17 (Halomed, Lithuania). CG received placebo (inhalations with room air) instead of DSCA. Clinical, functional parameters and measures of health-related quality of life (HRQL) by SF-16 and LCQ (10 items) were estimated after RT procedures and in 3 months. Results. Improvements of clinical symptom scores were observed in the both groups after the course of RT (p<0.05), but in 3 months positive effect was noticed only in IG (before-13.8±5.4, after RT- 9.1±4.9, in 3 months -9.6±4.3, p<0.05). Measures of LCQ were changed significantly after RT only in pts of IG, received DSCA (35.2±5.2 and 52.4±6.3, p<0.05). Positive changes of physical functioning measures were observed (SF-16) in IG and CG groups after RT, but they have been kept till 3 month only in IG. Conclusions. Application of inhalations of DSCA on the background of the RT in pts with COPD renders to positive effect.