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HALOTHERAPY FOR TREATMENT OF RESPIRATORY DISEASES

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ABSTRACT

DESCRIPTION OF HALOTHERAPY

This work elucidates the questions upon the development of a new drug-free method for respiratory diseases treatment. Haloth
controlled air medium which simulates a natural salt cave microclimate. The main curative factor is the dry sodium chloride ae

Particles density (0.5-9 mg/m³) varies with the type of the disease. Other factors are: comfortable temperature, humidity regime environment saturated with the aerosol.

The effect of HT was evaluated in 124 patients (pts) with various types of respiratory diseases. The control group of 15 pts receiv daily procedures of 1 hour. HT resulted in improvements of clinical state in the most of the patients. The positive dynamics of flow bronchial resistance measured by bodyplethysmography were observed. The changes in the control group parameters after HT wer of this method is the low concentration and gradual administration of dry sodium chloride aerosol. Data on healing mechanisms sodium chloride while treating the respiratory diseases are discussed.

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INTRODUCTION

The considerable increase of allergic diseases and reactions and of other serious complications due to the drug therapy explains t of drug-free methods of treatment. Halotherapy ("halos" in Greek means salt) is one of such methods. Halotherapy (HT) is a mod which simulates a natural salt cave microclimate.

The treatment in the natural salt caves (Speleotherapy) has been known since long. The efficacy of Speleotherapy is associate natural dry sodium chloride aerosol is the major curative factor of the cave microclimate. It is formed by the convective diffusi comfortable temperature and humidity regime, the hypo bacterial and allergen-free air environment saturated with aero ions enhanc

A suggestion that it is the air saturated with saline dust that causes the main curative effect in the Speleotherapy of patients with res Polish physician F.Bochkowsky in 1843. Salt mines are known to be used for therapeutic purposes in other countries such as Austr Poland (Wieliczka), Azerbaijan (Nakhichevan), Kirgizia (Chon-Tous), Russia (Berezniki, Perm region), the Ukraine (Solotvino, Carpa

Speleotherapy has been recognized as a highly effective drug-free treatment method. Great experience in the treatment of patient pulmonary diseases has proved Speleotherapy to be very effective under the conditions of the salt mine microclimate of Solotvino. the data of biochemical immunological and microbiological research (Simyonka 1989, Slivko, 1980, Yefimova et al, 1990, Zadorozh the treatment the organism adapts to the specific features of the microclimate and alters all its functional systems.

However, adaptation of the patients who came from different climate areas, travel and transport problems, and limited number of has been worked out.

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DESCRIPTION OF HALOTHERAPY

HT is performed in a special room with salt coated walls -Halochamber. Dry sodium chloride aerosol (DSCA) containing the domina I) is produced by a special nebulizer.

TABLE I

Fractions of dry sodium chloride aerosol in Halochamber (According to the data of optical dev

Size of particles, mkm	Fractions, %
1-2	35.4 ± 2.1

2-5	61.8 ± 3.3
5-10	2.8 ± 0.4
>10	0.003

TABLE 2

Composition criteria requirements for salt to be used in halotherapy.

Chemical composition of salt	% (mass)	Chemical composition of salt	
Na, not less than	97.70	Fe2O3, not more than	
Ca-ion, not more than	0.50	Na2SO4	
Mg-ion, not more than	0.10	Water insoluble sediment, not more than	
SO4 - ion, not more than	1.20	Moisture in rock-salt, not more than	
K-ion, not more than	0.10	pH of NaCL solution	

The constant level of desirable aerosol mass concentration in the range of 0.5-9 mg/m³ is maintained automatically. Composition of
2 (The Russian State Standard is 13830 - 4). The temperature of 18-22 C and 45-55% humidity of the medium are maintained by ai
The HT process and microclimate parameters are controlled with the help of computer.

The treatment in Halochamber is conducted daily, the duration of the procedure is 1.0 hour, and the length of the course is 12-2
parameters of aerosol medium depend on nosology, clinical features, phase of the disease, etc and are prescribed by the physician
the DSCA concentration may be changed during the period of treatments in accordance with the requirements of the changing state

The patients breathe quietly while reclining in the special armchairs. Therapy is accompanied by musical psycho suggestive pr
carried out either alone or in association with the base medication and other methods of treatment.

TABLE 3

Concentrations of dry sodium chloride aerosol and duration of halotherapy.

Disorders	Specificity	FEV1 (% Pr.)	Concentration (mg/m³)	HT duration (days)
Bronchial asthma	Allergic	-	0.5-1	12-14
	Infection dependent	<60 >60	0.5-1 1-2	18-21
Chronic obstructive bronchitis	-	<60	0.5-1	18-21
Chronic nonobstructive bronchitis	-	-	3-5	18-21
Bronchiectasis	-	<60 >60	1-2 7-9	21-25
Cystic fibrosis	-	-	3-5	21-25

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MATERIAL AND METHODS

HT was administrated in a group of 124 patients (54 males and 70 females) aged from 16 to 62 years (mean age 34.3 2.5 years) wit pulmonary diseases (Table 4). In all of the patients (pts), the disease was in the stage of a prolonged exacerbation. Before the treatr had been coughing, half of them (47%) had severe attacks of coughing with scanty viscous sputum. Most of the pts (81%) suffered f them used combined medication to control it. Auscultation revealed harsh and weakened breathing, and dry rales in 58% of the pati

60% of the pts received a base therapy (beta-agonists, theophyllines, chromoglycate natrii, corticosteroids, etc.), the effect of which achieve a complete remission. The pts had not taken any antibacterial medicine.

The control group was represented by 15 pts (7 females and 8 males) aged from 18 to 56 years (mean age 38.4 1.5 years). Placebo of musical psychosuggestive program with slides demonstration in an ordinary room.

The pts' condition was assessed by daily medical supervision, with functional and laboratory tests made before and after HT, as well Series of examinations in the control group consisted of the tests similar to those for the main group of pts.

TABLE 4

The patients studied

Disease	Number of patients
Bronchial asthma	87
Mild	32
Moderate	34
Severe	21
Chronic bronchitis	26
Nonobstructive	12
Obstructive	14
Bronchiectasis	6
Cystic fibrosis	5
Total	124

Standard method of flow-volume loop was registered by "Pneumoscreen" ("Jager", Germany).The following parameters were asses forced expiratory volume of the 1st sec FEV1), peak expiratory flow (PEF), forced expiratory flow at 5O% FVC (FEF50). The cha impairment were estimated according to predicted values and limits of norm and its deviation (Klement et al, 1986). Dynamics of the their absolute meaning before and after therapy and were expressed in % or the initial value. Individual assessment of the results w parameters and their variability. Inhalation bronchospasmolytic test with 0.4 mg of Berotec was carried out in 56 patients before an When the test was positive, the obstructions was considered to be reversible i.e., bronchospastic component was significant in the (Raw) and intrathoracic gas volume (ITGV) were measured by "Bodyscreen" ("Jager", Germany). Total lung capacity (TLC), resi were calculated on the base of spirography and bodyplethysmography data. Raw analysis was carried out in absolute values, predicted values (Kristufec et al, 1979). Diffusion capacity of the lungs by steady state method (DLss) was measured by "Trans predicted values (Pivotean & Dechouret et al, 1968).

Standard methods of variation statistics were used for group analysis of the material, students' test being used for significant samples.

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RESULTS

Clinical studies

After 3-5 sessions of HT 70-80% of the pts (according to nosology) presented some improvements: expectoration of good amount o to discharge, better auscultator pattern of the lungs, less frequent occurrence of cough attacks or respiratory discomfort. Some pts w (BA) (35 patients - 27% of the total number) experienced difficulty in brining up the phlegm and worsening of cough during 3-4 day seem to be due to the temporal bad bronchial drainage resulting from hyper secretion of mucus and discharge of old clots of s Expiratory dyspnea appeared or became more pronounced in 18 patients (15% or cases) at different periods of HT. Those were asthma and aspirin-induced asthma. None of the pts complained of bad condition during the HT procedures.

By the end of the course of HT all the pts felt better they slept well, had no fatigue or weakness, and their nervous system stabilized that the number of asthma attacks and respiratory discomfort cases decreased significantly as compared to the initial ones (81% an of asthma attacks controlled by combined medication also decreased (32% and 2%, respectively, $p<0.001$).

The cases of cough occurred more rarely (95% and 70%, respectively, $p<0.001$), cough became easier and more productive, t mucousal. The number of the patients with signs of vasomotor rhinitis decreased (61% and 24%, respectively $p<0.001$).

Corticosteroids were discontinued in 50 % (11 pts) of the pts with corticosteroid therapy (22 pts). Those were the cases when inhal inflammatory agents. In 7 pts it was possible to reduce the dose, 41 pts (60% of pts who inhaled beta- agonists) were able to disc Reduction (or cancellation) in bronchodilator and inhaled corticosteroid consumption was an indicator of clinical benefit.

The clinical state of 85% of the pts with mild and moderate BA, 75 % with severe BA, 98%- with chronic bronchitis, bronchiectasis pts were examined 6 and 12 months after the first HT course. No aggravations of the disease were seen from the 3d to the12th mo was 7.6-0.9 m. Most of the pts (60%) used no medication and sought no medical advice.

Lung function studies

Before HT bronchial obstruction was found in 83 pts (67% of all cases), 1/3 of them (25 pts) had marked impairment. By the en found in 50% of the pts but the numbers of cases with marked impairment were diminished (16 pts) (Fig.1).

Direct effect of a HT procedure on bronchial potency was studied in 12 pts. The difference between the average flow-volume loop was insignificant ($p>0.05$) when compared to the initial values.

Individual analysis showed that 5 pts had a significant increase of the parameters, a decrease was seen in 4 pts and in 3 cases the data it is impossible to estimate the real action of DSCA on bronchial patency.

The patients showed significant increase of FVC, FEV1, PEF, FEF50 by the 7th day, of FVC and FEF50 by the 14th day and of FV There was no difference in the extent of the parameter changes after the 7th day and by the end of the treatment.

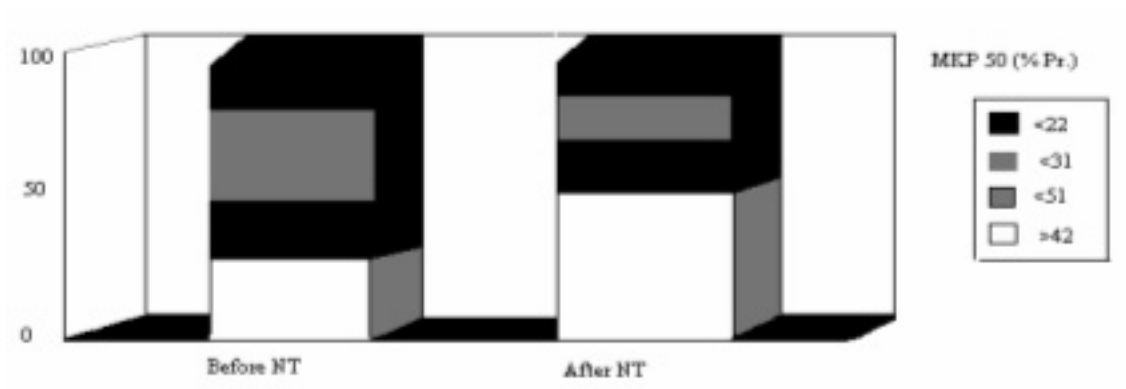

FIGURE I. Bronchial obstruction before and after the halotherapy (number of patients - 124

TABLE 5

Change of flow-volume loop parameters at various terms of halotherapy (Mean ± SE)

Parameter, % baseline	Treatment		
	7 days	14 days	End of course
Number of cases	115	98	124
VC	0 ± 0.9	2 ± 1.3	2 ± 0.9*
FVC	2 ± 0.9*	3 ±1.3*	2 ± 1.0*
FEV1	3 ± 1.2*	3 ± 1.6	2 ± 1.3
PEF	4 ± 1.4*	3 ± 1.9	3 ± 1.2*
FEF 50	7 ± 1.5*	7 ± 2.9*	2 ± 2.0

*significant ($p < 0.05$, here and further) changes vs initial values (paired t-test)

Findings of bodyplethysmography and diffusion capacity of the lungs are given in Table 6. After the HT there was a significant decre changes were insignificant.

To know whether the initial extent of obstruction had any effect on the dynamics of bronchial patency during HT all pts were divided obstruction (Table7). Group I included patients with normal indices of forced expiration (FEF 50>62%Pr.); group II - with mild <51%Pr.); group III - with moderate (FEF50<31%Pr.), and group IV - with severe obstruction (FEF50<22%Pr.)

TABLE 6

Bodyplethysmography and diffusion capacity of lung before and after halotherapy (M ± SE), number of patients-85.

Parameter, (% baseline)	Treatment	
	before	after
VC	99 ± 3	102 ± 3
ITGV	141 ± 4	133 ± 5
RV	156 ± 6	139 ± 7
TLC	111 ± 2	109 ± 3
RV/TLC	142 ± 5	126 ± 6*
Raw*	0.37 ± 0.04	0.28 ± 0.02*
DLss	83 ± 7	79 ± 4

x in kPa/l/s

* significant differences as compared to "before"

TABLE 7

Dynamics of bronchial obstruction indices at the end of halotherapy as compared to the initial extent of obstruction (M ± SE).

Parameter, (% baseline)	Groups			
	I	II	III	IV

	FEF 50 > 62%	FEF 50 < 51%	FEF 50 < 31%	FEF 50
Number of cases VC FVC FEV1 PEF FEF 50	41 -1 ± 1.1 -1 ± 1.2 -3 ± 1.3 1 ± 1.6 -3 ± 2.9	31 1 ± 1.3 0 ± 1.4 0 ± 1.9 -1 ± 1.9 -1 ± 3.7	27 8 ± 2.5* 5 ± 2.9 7 ± 4.2 ° 4 ± 4.2 22 ± 9.0*°	25 14 ± 4.9 14 ± 4.9 25 ± 8.1 37 ± 10. 33 ± 11.

* Significant changes as compared to the initial values
° significant difference from groups I and II
x significant difference from groups III.

At the end of HT the indices in groups I and II did nor differ from the initial ones. In group III values of FEF 50 became signi significantly increased. The extent of changes of group IV indices was significantly greater than of groups I and II. Similar findings HT. Irrespectively of the therapy duration the greatest dynamics in bronchial patency were found in group IV (severe obstruct (moderate obstruction), and no dynamics were seen in groups I and II (slight or no obstruction).

Relationship between the character of obstruction disorders and the changes in indices during the course of therapy were studied tests the pts were divided into two groups: those with reversible and irreversible obstruction. By the end of HT no significant differe were found ($p>0.05$). Both in the presence of bronchospasm and its absence the efficacy of HT on bronchial patency was the same.

Control group

One-two days after beginning of the therapy many placebo pts (80%) felt better and slept normally which seemed to be associated no objective improvement in their lung auscultation picture was noted. There were no significant changes of flow-volume loop para the course of placebo (VC- -3 ±5.0; FVC- -3 ±4.3; FEV1- -3 ±3.4; PEF- -6 ±2.6;FEF 50 -2 ±3.8).

At the same time, 20% of pts with prevailing allergic mechanism of the disease had positive dynamics of function values which wa allergens.

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DISCUSSION

The course of HT resulted in improvements of clinical state in the most pts. In the overwhelming majority of cases, the number and discomfort decreased or disappeared, which allowed, in a number of cases, to cancel or reduce the dosage of beta-agonists. T symptoms indicative of a better drain function of their airways: sputum secretion alleviates, it becomes less viscous, coughing re lungs alters. The difficulty in brining up the phlegm and worsening of cough during 3-4 days seemed to be due to the tempo hypersecretion of mucus and discharge of old clots of secretion from bronchi of smaller diameter.

The similar clinical results were obtained in other investigations. Efficacy of this method has been noted in pts with various pathoger bronchitis, bronchiectasis, upper airways diseases, etc. (Alexandrov & Chervinskaya et al, 1994, Chervinskaya et al, 1993, 1994, N 1992, Telyatnikova et al, 1992, Tikhomirova et al, 1993).

In our investigation the improvement in the clinical state of pts was accompanied by positive dynamics of the functional measurer bronchial patency which started on the 7th day and persisted to the end of the course. There was no direct bronchospasmolytic depended upon the initial extent of obstruction: the more marked was the bronchial obstruction, the better were the results of HT. T of obstruction (reversible or irreversible).

Thus, clinical functional results suggest, that HT has gradual positive influence on bronchial obstruction. With this mode of therapy

should be series of procedures. It seems to be associated with improvement of mucociliary clearance and decrease of br antiinflammatory influence is confirmed by the data of cytobacteriologic examinations (Chervinskaya et al, 1994).

The evaluation of brush samples from nosopharynx mucosa in HT showed that the average amount of neutrophils, macrophages ar index of epitheliocyte infection with pneumococci and that of adhesion the average number of pneumococci per one affected indicative of elimination in pathogenic microorganisms and of decrease in inflammatory reaction of the mucosa. Other investigation neutrophils and pathogenic microorganisms and increase of the amount of alveolar macrophages in bronchial secretion of pts w cystic fibrosis after HT (Voronina at al, 1994). Research testified of positive effects of HT on the state of humoral and cellular imm 1990, Torokhtin et al, 1987); decrease of IgE level was observed (Dityatkovskaya et al, 1993). Certainly, the arguments of muco necessary.

HT is a type of aerosol therapy, which takes from Speleotherapy the main acting factor. Curative effect of HT is caused by aero sodium chloride aerosol with predominance amount of particles of 2 to 5 mkm in size. Such particles can penetrate deep into the sm

In our view, the positive effect of HT can be accounted for the following. One of the pathogenetic mechanisms of obstructive pul impairment. Normal function of mucociliary clearance depends on the amount and viscoelastic properties of the airway surface liqui the cilia. Aerosol of sodium chloride initiates the fluid release into the bronchial lumen, and influences the viscoelastic properties conformation of protein molecules and releasing water into the outer layers of the clots which promotes evacuation of bronchial spu Wurtemberger et al, 1987). In addition, sodium chloride is the main component of the airway surface liquid, the mucus layer and functioning of bronchial ciliary epithelium (Wetch M.J., 1987). According to the evidence of certain authors, the amount of sodium with chronic pulmonary pathology is lower (Brogan et al, 1971). It is possible, that inhalation of this chemical compound compensa the ciliary epithelium drainage function.

Sodium chloride aerosol causes bactericidal and bacteriostatic effects on the respiratory airways microflora and prevents the (Simyonka, 1989, Rein & Mandell, 1973). The intensity of this action depends on the concentration of the aerosol that cause impairment of the albuminous structure of the cells killing the microorganisms. Another mechanism is possible which causes adh bodies. As their mass grows, they precipitate rapidly.

The experiments show that low doses of DSCA have a beneficial effect on phagocytic activity of alveolar macrophages (Konov clearance and elimination of foreign agents.
Thus, sodium chloride aerosol improves rheological properties of the bronchial contents, decreases edema of bronchial muco epithelium, it has a bactericidal action, enhances functioning of alveolar macrophages.

The study of aerodisperse environments of halochamber allowed to establish that the negative volumetric charge of dry aeroso (Konovalov et at, 1990). Higher negative charge of particles is of therapeutic significance as well (Afanasyev, 1990).

However, it is known, that sodium chloride aerosol is an osmolar stimulus, and it can result in the airways hyperactivity (Schoeffel e concentration and gradual administration of DSCA. Salt consumption during the procedure depends upon the regime chosen an chloride aerosol inhalation challenge is used for diagnosing hyperactivity of the airways. Hypotonic (less than 0.9%) or hyperton usually employed. When the inhalator production is 1 ml per minute, 20 mg of sodium chloride (measured as a dry substance) g challenge test with 2% solution and the amount reaches 50 mg in case of 5% solution. Compare: during a minute session of penetrates into the patient's airways when the concentration in the Halochamber is 5 mg/m3. Sodium chloride aerosol in low conce thus preventing any side effects. Besides, using of dry aerosol permits to achieve the suitable humidity of environment and to associated with humidification (Linker, 1982)

In summary, theoretical prerequisites and the data of clinical functional studies obtained allow to suggest that the efficacy of HT re properties of sodium chloride aerosol and the way of its administration. At the same time HT mechanisms of influence are not yet continuation of the research.

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Vestn Otorinolaringol. 2003;(4):42-4.

[Halotherapy in combined non-puncture therapy of patients with acute purulent maxillary sinusitis]

[Article in Russian]

Grigor'eva NV.

Halotherapy was applied for non-puncture treatment of 45 patients with acute purulent maxillary sinusitis. The response was evaluat
cytological, x-ray and bacteriological parameters. Halotherapy was found effective in the treatment of acute purulent maxillary sinusi

PMID: 13677023 [PubMed - indexed for MEDLINE]

Vopr Kurortol Fizioter Lech Fiz Kult. 2001 Jan-Feb;(1):26-7.

[Efficacy of therapeutic use of ultrasound and sinusoidal modulated currents combed with halotherapy in patient with occu

[Article in Russian]

Roslaia NA, Likhacheva EI, Shchekoldin PI.

Immunological and cardiorespiratory characteristics were studied in 88 alloy industry workers with occupational toxic-dust bronchitis sinusoidal modulated currents (SMC), ultrasound (US) on the chest, halotherapy (HT) (52 patients, group 1); SMC HT (10 patients, g (11 patients, group 4). The patients did also therapeutic exercise and were massaged (chest). It was found that device physiotherap the treatment efficacy to 86.5%. This combined treatment is recommended both for treatment and prevention of obstructive syndrom

PMID: 11530404 [PubMed - indexed for MEDLINE]

Klin Med (Mosk). 2000;78(12):37-40.

[Effects of halotherapy on free radical oxidation in patients with chronic bronchitis]

[Article in Russian]

Farkhutdinov UR, Abdrakhmanova LM, Farkhutdinov RR.

Registration of luminol-dependent chemoluminescence of blood cells and iron-induced chemoluminescence of the serum was used and lipid peroxidation in patients with chronic bronchitis (CB). 49 patients with lingering CB showed inhibition of blood cell function a addition of halotherapy to combined treatment of these patients promoted correction of the disorders and improvement of CB course

Publication Types:
" Clinical Trial

PMID: 11210350 [PubMed - indexed for MEDLINE]

Vopr Kurortol Fizioter Lech Fiz Kult. 2000 Nov-Dec;(6):21-4.

[Effectiveness of halotherapy of chronic bronchitis patients]

[Article in Russian]

Abdrakhmanova LM, Farkhutdinov UR, Farkhutdinov RR.

The chemoluminescence test in 49 patients with lingering inflammatory chronic bronchitis has revealed inhibition of generation of ac intensification of lipid peroxidation in the serum, depression of local immunity. Administration of halotherapy to the above patients re radical oxidation, improves local immunity and clinical course of the disease.

PMID: 11197648 [PubMed - indexed for MEDLINE]

Vopr Kurortol Fizioter Lech Fiz Kult. 2000 Jan-Feb;(1):21-4.

[The scientific validation and outlook for the practical use of halo-aerosol therapy]

[Article in Russian]

Chervinskaia AV.

The paper describes a new medical technique--halo-aerosol therapy, the main acting factor of which is dry highly dispersed aerosol concentration. Halo-aerosol therapy represents a new trend in aerosol medicine. It includes two methods: halotherapy and halo-inha foundations of the new method, how it can be realized are outlined. Clinical reasons are provided for application of halo-aerosol ther rehabilitation of patients with respiratory diseases. Characteristics and differences of the two halo-aerosol therapy variants are analy

Publication Types:

" Review

PMID: 11094875 [PubMed - indexed for MEDLINE]

Voen Med Zh. 1999 Jun;320(6):34-7, 96.

[Halotherapy in the combined treatment of chronic bronchitis patients]

[Article in Russian]

Maev EZ, Vinogradov NV.

Halotherapy proved to be a highly effective method in a complex sanatorium treatment of patients with chronic bronchitis. Its use pro
manifestations of disease, improves indices of vent function of lungs, especially those values that characterize bronchial conduction
index Tiffno), increases tolerance to physical load, normalizes indices of reduced immunity and leads to increasing the effectiveness

PMID: 10439712 [PubMed - indexed for MEDLINE]

Vopr Kurortol Fizioter Lech Fiz Kult. 1997 Jul-Aug;(4):19-21.

[The use of an artificial microclimate chamber in the treatment of patients with chronic obstructive lung diseases]

[Article in Russian]

Chernenkov RA, Chernenkova EA, Zhukov GV.

Halotherapy was used for sanatorium rehabilitation in 29 patients with chronic obstructive pulmonary diseases (chronic bronchitis an
this method resulted in the improvement of the flow-volume parameters curve of lung function and in hypotensive effects on blood pr
use in patients suffering from chronic obstructive pulmonary diseases with hypertension or coronary heart disease.

PMID: 9424823 [PubMed - indexed for MEDLINE]

J Aerosol Med. 1995 Fall;8(3):221-32.

Halotherapy for treatment of respiratory diseases.

Chervinskaya AV, Zilber NA.

Saint-Petersburg Pavlov National Medical University, Russia.

This work elucidates the questions upon the development of a new drug-free method of a respiratory diseases treatment. Halotherap
controlled air medium which simulates a natural salt cave microclimate. The main curative factor is dry sodium chloride aerosol with
density (0.5-9 mg/m3) varies with the type of the disease. Other factors are comfortable temperature- humidity regime, the hypobact
saturated with aeroions. The effect of HT was evaluated in 124 patients (pts) with various types of respiratory diseases. The control
course consisted of 10-20 daily procedures of 1 hour. HT resulted in improvements of clinical state in the most of patients. The posit
parameters and decrease of bronchial resistance measured by bodyplethysmography were observed. The changes in control group
significant. The specificity of this method is the low concentration and gradual administration of dry sodium chloride aerosol. Data or
airdispersive environment of sodium chloride while while treatment the respiratory diseases are discussed.

PMID: 10161255 [PubMed - indexed for MEDLINE]

Ter Arkh. 1996;68(8):24-8.

[Bronchial hyperreactivity to the inhalation of hypo- and hyperosmolar aerosols and its correction by halotherapy]

[Article in Russian]

Gorbenko PP, Adamova IV, Sinitsyna TM.

18 bronchial asthma (BA) patients (12 with mild and 6 with moderate disease) were examined before and after halotherapy (HT) for with ultrasonic inhalations of purified water (UIPW) and hypertonic salt solution (HSS). Bronchial hyperreactivity (BHR) to UIPW and 11 patients (72 and 69%, respectively). HT reduced BHR in 2/3 and 1/2 of the patients, respectively. In the rest patients BHR was un only in patients with atopic asthma in attenuating exacerbation. Clinical efficacy of HT and initial BHR to UIPW correlated (r = 0.56; p between HT efficacy and initial BHR to HSS.

PMID: 9019826 [PubMed - indexed for MEDLINE]

Vopr Kurortol Fizioter Lech Fiz Kult. 1995 Jan-Feb;(1):11-5.

[The use of halotherapy for the rehabilitation of patients with acute bronchitis and a protracted and recurrent course]

[Article in Russian]

Borisenko LV, Chervinskaia AV, Stepanova NG, Luk'ian VS, Goncharova VA, Pokhodzei IV, Krivitskaia VZ, Vishniakova LA, Pokhazn

Halotherapy was used for rehabilitation in 25 patients with acute bronchitis of long-standing and recurrent types. The main therapeu medium saturated with dry highly dispersed sodium chloride aerosol, the required mass concentration being maintained in the range controlled through assessment of clinical, functional, immunological and microbiological findings. Metabolic activity values were take dynamics of the function indices in the clinical picture resulted from elimination of pathogenic agents, control of slowly running inflam immune system factors. Favourable changes in metabolic activity were present: normalization of serotonin excretion, marked decrea antioxidant system.

PMID: 7785211 [PubMed - indexed for MEDLINE]

13: Vopr Kurortol Fizioter Lech Fiz Kult 1994 Jul-Aug;(4):34-5

[The efficacy of speleotherapy in atopic dermatitis in children]

[Article in Russian]

Puryshev EA.

After proper clinical and immunological examinations 112 children with atopic dermatitis underwent immunocorrective speleotherapy created with the use of natrium chloride spraying. During the treatment positive trends were observed in the patients' dermatological complete 6-24-month response was reported in 58%, partial in 20%, no response in 6.9% of patients. The method is recommended

PMID: 7846884 [PubMed - indexed for MEDLINE]

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SALINE TREATMENTS FOR UPPER AND LOWER RESPIRATORY TRACT DISORDERS

E. Daviskas, S.D. Anderson, I. Gonda, S. Eberl, S. Meikle, J.P. Seale, and G. Bautovich

Eur Respir J 1996; 9: 725-732

Nebulised hypertonic saline for cystic fibrosis (Cochrane Review)

Wark PAB, McDonald V

ABSTRACT

A substantive amendment to this systematic review was last made on 01 February 2000. Cochrane reviews are regularly checked a

Background: The lung disease in cystic fibrosis is characterized by impaired mucociliary clearance, recurrent bronchial infection ar has been shown to enhance mucociliary clearance in-vitro and this may act to lessen the destructive inflammatory process in the ai

Objectives: To determine if nebulised hypertonic saline treatment improved lung function, exercise tolerance, quality of life and dec respiratory infections in patients with cystic fibrosis.

Search strategy: Studies were identified from the Cochrane Cystic Fibrosis and Genetic Disorders Group trials register. Titles and controlled trials. Reviewed articles and bibliographies identified from this process were surveyed for additional citations & RCTs. Ide obtained from abstract books from the three major Cystic Fibrosis conferences (International Cystic Fibrosis Conference, The Euro North American Cystic Fibrosis Conference). Trial authors were contacted for additional information when only abstracts were avail

Date of the most recent search of the Group's specialized register: February 2000.

Selection criteria: All controlled trials that assessed the effect of hypertonic saline compared to placebo or other mucolytic therapy subjects with cystic fibrosis of any age or severity were reviewed. Studies in languages other than English were included.

Data collection and analysis: All identified trials were independently reviewed by both reviewers & all data collected. Trial quality of allocation concealment & the Jadad scale of methodological quality.

Main results: Twelve controlled trials of hypertonic saline were identified. Seven trials met the inclusion criteria; these involved 143 years. Of these, six were published studies and one in abstract form. The durations of the trials were limited to immediate effects or three weeks.

In two studies, involving thirty five subjects, a score for the feeling of cleared chest was made using visual analogue scales. This ar difference of -0.98 (95% Confidence Interval -1.6, -0.34), favouring hypertonic saline over isotonic saline.

In two trials with 22 subjects hypertonic saline improved mucociliary clearance as measured by isotope clearance from the lungs in mean difference of -11.3 (95% CI -18.6, -4.0), and as area under the clearance time curve; weighted mean difference of -212 (95% saline over isotonic saline.

Lung function as measured by improvement in FEV1 was observed in one study of 27 subjects. The percentage increase in FEV1 a with hypertonic saline and 2.8% with isotonic saline (p=0.004).

Adverse events were adequately described in only one trial and none were serious.

Reviewers' conclusions: Nebulised hypertonic saline improves mucociliary clearance immediately after administration wh effect in cystic fibrosis.

The maximum time data were recorded for was only three weeks. Most of the patients had mild to moderate lung disease and t unclear.

Further studies of hypertonic saline should be carried out to determine the effect on pulmonary function tests, quality of life, f
disease and efficacy comparisons with nebulised deoxyribonuclease, with larger numbers and for longer duration.

At this stage there is insufficient evidence to support the use of hypertonic saline in routine treatment for patients with cystic fibrosis

Citation: Wark PAB, McDonald V. Nebulised hypertonic saline for cystic fibrosis (Cochrane Review). In: The Cochrane Library, 1, 2

MeSH: Administration, Inhalation; Cystic Fibrosis/*drug therapy; Human; Nebulizers and Vaporizers; Saline Solution, Hypertonic/ad

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Efficacy of daily hypertonic saline nasal irrigation among patients with sinusitis: a randomized contr

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Objectives: To test whether daily hypertonic saline nasal irrigation improves sinus symptoms and quality of life and decreases mec
of sinusitis.

Study design: Randomized controlled trial. Experimental subjects used nasal irrigation daily for 6 months.

Population: Seventy-six subjects from primary care (n=70) and otolaryngology (n=6) clinics with histories of frequent sinusitis wer
control (n=24) groups.

Outcomes measured: Primary outcome measures included the Medical Outcomes Survey Short Form (SF-12), the Rhinosinus
Item Sinus-Symptom Severity Assessment (SIA); all 3 were completed at baseline, 1.5, 3, and 6 months. Secondary outcomes incl
biweekly assessment of symptoms and medication use. At 6 months, subjects reported on side effects, satisfaction with nasal ir
their sinus-related quality of life.

Results: No significant baseline differences existed between the 2 groups. Sixty-nine subjects (90.8%) completed the study. Comp
RSDI scores improved from 58.4 -/ 2.0 to 72.8 -/ 2.2 (P < or =.05) compared with those of the control group (from 59.6 -/ 3.0 to 6
improved from 3.9 -/ 0.1 to 2.4 -/ 0.1 (P < or =.05) compared with those of the control group (from 4.08 -/ 0.15 to 4.07 -/ 0.27). Th
improvement on RSDI at 6 months was 2.0. Experimental subjects reported fewer 2-week periods with sinus-related symptoms (P
used less nasal spray (P =.06). On the exit questionnaire 93% of experimental subjects reported overall improvement of sinus-
worsening (P <.001); on average, experimental subjects reported 57 -/ 4.5% improvement. Side effects were minor and infrequ
statistically significant improvement on the SF-12.

Conclusions: **Daily hypertonic saline nasal irrigation improves sinus-related quality of life, decreases symptoms, and dec
frequent sinusitis. Primary care physicians can feel comfortable recommending this therapy.**

Publication Types:
• Clinical Trial
• Randomized Controlled Trial

PMID: 12540331 [PubMed - indexed for MEDLINE]

The information taken from National Library of Medicine (NLM)
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The NEW ENGLAND JOURNAL of MEDICINE

A Controlled Trial of Long-Term Inhaled Hypertonic Saline in Patients with Cystic Fibrosis

Elkins M. R., Robinson M., Rose B. R., Harbour C., Moriarty C. P., Marks G. B., Belousova E. G., Xuan W., Bye P. T.P., the National (NHSCF) Study Group

N Engl J Med 2006; 354:229-240, Jan 19, 2006.

Mucus Clearance and Lung Function in Cystic Fibrosis with Hypertonic Saline

Donaldson S. H., Bennett W. D., Zeman K. L., Knowles M. R., Tarran R., Boucher R. C.

N Engl J Med 2006; 354:241-250, Jan 19, 2006.

PEDIATRIC ALLERGY AND IMMUNOLOGY

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Volume 14 Issue 2

ABSTRACT

Recent evidence suggests that nasal irrigation with hypertonic saline may be useful as an adjunctive treatment modality in the m
However, no previous studies have investigated the efficacy of this regimen in the prevention of seasonal allergic rhinitis-related s
children with seasonal allergic rhinitis to Parietaria were enrolled in the study. Ten children were randomized to receive three-time d
for the entire pollen season, which had lasted 6 weeks. Ten patients were allocated to receive no nasal irrigation and were use
based on the presence of nasal itching, rhinorrea, nasal obstruction and sneezing was calculated for each week of the pollen se
use oral antihistamines when required and the mean number of drug assumption per week was also calculated. In patients all
rhinitis score was reduced during 5 weeks of the study period. This reduction was statistically significantly different in the 3th, 4
decreased consumption of oral antihistamines was observed in these patients. This effect became evident after the second wee
significant differences during the 3th, 4th and 6th week. This study supports the use of nasal irrigation with hypertonic saline in t
rhinitis during the pollen season. This treatment was tolerable, inexpensive and effective.

Garavello W, Romagnoli M, Sordo L, Gaini RM, Di Berardino C, Angrisano A. Hypersaline nasal irrigation in children with
randomized study.
Pediatr Allergy Immunol 2003: 14: 140–143. © 2003 Blackwell Munksgaard