

THE EFFECT OF HALOTHERAPY IN CHILDREN - OUR EXPERIENCE

G.Gunek Mačukat¹, A.Cvitković Ročić², L.Kotulja², N.Pustišek², Ana Čipak Gašparović², I.Majica², I.Babić², M.Šimundić², M.Šunić Ormež²

- 1) Polyclinic for Children, Helena, Zagreb, Croatia
- 2) Department of Dermatology and Venereology, University Hospital Centre "Sisters of mercy", Zagreb, Croatia.
- 3) Children's Hospital Zagreb, Zagreb, Croatia
- 4) Rudjer Boskovic Institute, Zagreb, Croatia
- 5) Natalis Samobor d.o.o., Samobor, Croatia
- 6) Polyclinic for Child Protection Centre of Zagreb, Zagreb, Croatia



Intro

Halotherapy is a therapy based on beneficial effects of dry salt aerosol that achieves positive effects on numerous body organs, especially on the respiratory system by inhaling the same. According to a significant number of medical articles, halotherapy should be considered as add-on therapy for mild asthma.

Application methods of halotherapy are mucociliary clearance, bacteriostatic, bactericidal, anti-inflammatory effects and increase in the number of alveolar macrophages and phagocytes. Ministry of Health of Russia in 1995. And Ministry of Health of Canada in 2002. registered halocomplex and halogenerator with specific parameters as medical device.

In Russia and Estonia halotherapy is included in the public health care system. In addition, most of the research on the respiratory system has been conducted on adults. The goal of this research is to monitor the influence of halotherapy on children with asthma, pollinosis, recurrent obstructive bronchitis, atopic dermatitis, secretion otitis, recurrent laryngitis and chronic rhinitis.

Results

Within the group of children suffering from asthma and recurrent obstructive bronchitis, 7 out of 24 patients stopped the drug prophylaxis after the halotherapy and the symptoms have not returned in the next year. In 9 out of 24 patients, halotherapy reduced the drug prophylaxis and the symptoms have not returned in the next year. Out of total 12 pollinosis patients, 3 of them were without any symptoms and drug prophylaxis during the pollination. Two out of these 12 were without the usual recurrent respiratory obstruction during the pollination with the drug prophylaxis. Six out of 12 patients had minimum symptoms with the occasional drug therapy. One out of 12 patients did not manage to control the disease with the drugs and halotherapy.

Due to the cooperation difficulties with small children, in small number of patients we conducted spirometry (9). Pulmonary function was measured before and after the completion of the 14 treatment of halotherapy. In 2/9 patients without medical therapy, we observed improvement in lung functions with a still positive Ventolin test.

2/9 had proper lung function and had a positive Ventolin test, before and after halotherapy. 3/9 patients had milder bronchoconstriction measured by spirometry, before and after the treatment, with positive Ventolin test.

In 2/9 patients lung function improvement was noticed, with the conversion of Ventolin test, of which one patient was on drug-prophylaxis and the other has received only halotherapy treatment.

Within the group of children suffering from atopic dermatitis, SCORAD index varied from 20 to 61.8 (average of 36.74) before the halotherapy and after the therapy it varied from 3 to 50 (average 21.85) which was the evidence of the clinical improvement of the patients. A part of the respiratory patients noticed the improvements of symptoms and local test results.

At 2/4 patients with recurrent laryngitis, during the therapy, a milder attack had occurred at home treatment. In 1/4 patient, during the 6 month follow-up process, there was only one milder attack noticed.

At 2/5 patients with secretory otitis there was no improvement in Tympanograms nor in endoscopic findings. In 2/5 patients were noted an improvement in both ears with improvement in symptoms and endoscopic findings. In the 1/5 child, curve C was proven with negative pressure, the same endoscopic findings, but with improvement in symptoms.

At all three children, which have carried out a complete treatment, because of frequent nasal secretions, the endoscopic findings were better, with less secretion and without changes to the mucous membrane of the nose. All had less nasal secretion without congestion. Sneezing and coughing did not calm down in 1/3 patient.

The best results (strengthened by *in vitro* results of slight stimulation of human fibroblast proliferation) have been noticed on the salt concentration applied at the children suffering from asthma. (Graph 2).

Methods

The two year study included 73 children (age 5 months to 18 years old) Halotherapy was carried out in the salt chamber/salt cocoon manufactured by Kokkonen LLC from Estonia (Figure 1) within which dry saline aerosol was inhaled. Microclimate was conducted with halogenerator IIRIS 136, certified for microclimate effect by University of Tartu, Estonia (graph 3).

The study group, consisted of pulmonary patients, being children suffering from persistent mild to moderate asthma taking the drug-prophylaxis and children suffering from recurrent obstructive bronchitis. In children above 5 years of age, we measured lung function using spirometry and conducted Bronchodilation test with Ventolin, before taking halotherapy treatments, in the middle of halotherapy treatment and after the last treatment. At the beginning of therapies, 7th and 14th day of halotherapy treatments, we conducted a questionnaire to monitor the intensity of symptoms and the need for medications.

In the group of patients with ORL problems, the effect of halotherapy was followed by objective examination, tympanometry and questionnaire, before halotherapy treatment, 7th and 14th day of halotherapy. The group of derma patients consisted of children suffering from medium-heavy and severe atopic dermatitis (SCORAD more than 20), taking the usual medical treatments. We monitored the effect of halotherapy to the objective severity of a clinical picture, measured with the standardized clinical instrument - SCORAD (SCORing Atopic Dermatitis) index before and after the completion of the halotherapy treatment. Along with the research *in vivo*, the influence of halotherapy was investigated *in vitro* on human lung fibroblast cell cultures cultivated in the salt cocoon conditioned media (Graph 2).

Conclusion

Based on the initial positive results obtained, it can be concluded that halotherapy should not be excluded as an additional methods of treatment. All the stated results are encouraging and demand more clinical studies as well as mechanistic molecular studies in order to understand mechanisms by which these positive effects are achieved, as well as all the possibilities of the halotherapy applications.



Figure 1. Salt cocoon Kokkonen-Estonia

Number of patients	34
Distribution by age	1-15y (5.02); 1-5y (18); 5-10y (11); 10-15y (5)
Distribution by gender	21 male; 13 female
Distribution by diagnosis	asthma (9); recurrent obstructive bronchitis (9); pollinosis (3); asthma and pollinosis (5); asthma+atopic dermatitis (2); recurrent obstructive bronchitis+atopic dermatitis (2); pollinosis+atopic dermatitis (2); asthma+pollinosis+atopic dermatitis (2)
Number of therapies	7-23 (13.6)
Halotherapy application method	salt cocoon (23); salt room (11)
Microclimate concentration	4-8mg/m ³
Time of session	10-30min
Interval of improvement	10 th (24 patients); 5 th (7 patients); more than 10 th (3)
Satisfaction with treatment	excellent (15); good (19)
Side effects	light temperature increase (2); exacerbation of atopic dermatitis AD (1); bronchoconstriction (1)
Wish for repeating HT and recommendation of HT	34

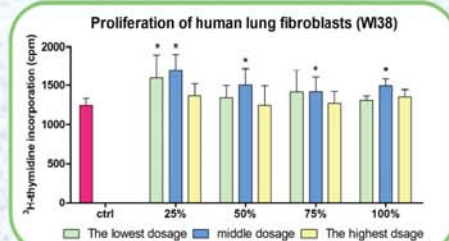
General information related to pulmo patients table 1

Number of patients started halotherapy	27
Number of patients finished halotherapy	20
Distribution by age	14 months to 15 y; average 5,9 y.
Number of therapies	12 to 23
Halotherapy application method	salt cocoon
Microclimate concentration	4-8mg/m ³
Time of session	10-30min
SCORAD index before halotherapy	from 20 to 61,8; average 36,74
SCORAD index after halotherapy	from 3 to 50; average 21,85

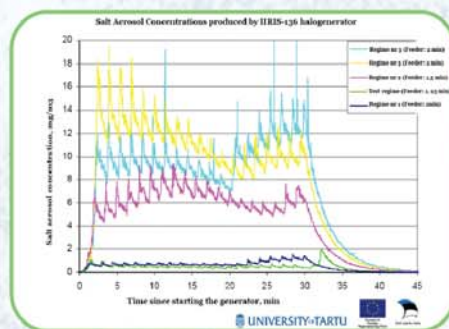
General information related to derma patients table 2.

Number of patients	12
Distribution by age	5 months to 18 y; average 7,7 y
Distribution by diagnosis	laryngitis (4); secretory otitis (5); secretion from the nose (3)
Number of therapies	18
Halotherapy application method	salt cocoon
Microclimate concentration	4-6mg/m ³
Time of session	20min

General information related to ORL patients table 3.



Graph 2 Proliferation of W38, human lung fibroblast culture when cultivated in media condition in the salt cocoon for 10 minutes. * Statistically significant difference when compared to control (ctrl)



Graph 3 IIRIS 136 - important characteristics of salt generator

1. Gunek Mačukat, A. Cvitković Ročić, L. Kotulja, N. Pustišek, Ana Čipak Gašparović, I. Majica, I. Babić, M. Šimundić, M. Šunić Ormež. The effect of halotherapy on children with asthma and recurrent obstructive bronchitis. *Journal of Inflammation* 2019; 2019:1-10. <https://doi.org/10.1155/2019/1475924>