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A survey based comparative analysis on the effectiveness of hypertonic sea water nasal spray as an adjunct to pharmacological treatment in Chronic rhino sinusitis

Authors: Col. Satwinder Pal Singh[1] (Classified Specialist) & Dr. Ashwani Sethi[2] (Professor) & Col. Gurbinder Singh Suri[3] (Sr. Adviser)

Dept. of Otorhinolaryngology and Head & Neck Surgery, 92 BH Srinagar (J&K)[1]

Dept. of Otorhinolaryngology and Head & Neck Surgery, Army College of Medical Sciences Delhi, Delhi Cantt[2]

Dept. of Otorhinolaryngology and Head & Neck Surgery, MH Jabalpur[3]

Corresponding Author: Col. Satwinder Pal Singh

Abstract

Background: Chronic Rhinosinusitis (CRS) is a common inflammatory disorder of the nasal cavity and paranasal sinuses characterized by nasal obstruction, nasal discharge, facial pain or pressure, and reduction in smell persisting for more than 12 weeks. Conventional pharmacological treatment including intranasal corticosteroids, antihistamines, saline irrigation, mucolytics, and antibiotics remains the cornerstone of therapy. Hypertonic sea water nasal sprays have recently emerged as promising adjunctive treatments due to their mucociliary clearance enhancing and anti-inflammatory properties.

Aim: To compare the effectiveness of hypertonic sea water nasal spray as an adjunct to conventional pharmacological treatment in patients with CRS.

Methods: A prospective survey-based comparative study was conducted among 50 patients aged 30–50 years diagnosed with CRS. Participants were divided into two equal groups. Group A received conventional pharmacological treatment alone, while Group B received conventional treatment along with hypertonic sea water nasal spray for 8 weeks. Clinical outcomes were evaluated using symptom severity scores, patient satisfaction surveys, endoscopic findings, and quality of life assessments using the Sino-Nasal Outcome Test-22 (SNOT-22).

Results: Baseline characteristics were comparable between both groups ($p>0.05$). At 8 weeks, Group B demonstrated significantly greater reduction in mean SNOT-22 score (22.4±5.1 vs 31.6±6.3, $p<0.001$), improved nasal obstruction scores (1.2±0.5 vs 2.4±0.8, $p<0.001$), and higher patient satisfaction rates (88% vs 60%, $p=0.021$). Endoscopic mucosal edema scores also improved significantly in Group B.

Conclusion: Hypertonic sea water nasal spray significantly improves symptom control, mucosal recovery, and patient satisfaction when used as an adjunct to standard pharmacological therapy in CRS patients.

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Keywords: Chronic rhinosinusitis, hypertonic sea water spray, adjunct therapy, SNOT-22, mucociliary clearance, nasal irrigation.

Introduction

CRS represents one of the most prevalent chronic inflammatory diseases affecting adults worldwide and imposes substantial healthcare costs and reduction in quality of life. The disease is defined by persistent inflammation of the sinonasal mucosa lasting longer than 12 weeks despite adequate medical management[1]. The estimated global prevalence ranges between 5% and 15%, with increasing incidence in urban populations due to environmental pollution, allergic disorders, and lifestyle changes.

The pathophysiology of CRS is multifactorial and involves persistent mucosal inflammation, impaired mucociliary clearance, microbial biofilms, structural abnormalities, and immunological dysfunction[2]. Patients commonly experience nasal blockage, postnasal drip, facial pressure, headache, anosmia, sleep disturbances, and reduced productivity.

Conventional treatment strategies include intranasal corticosteroids, oral antihistamines, saline irrigation, antibiotics during acute exacerbations, and surgical intervention for refractory cases. Despite these measures, many patients continue to experience residual symptoms and recurrent episodes[3].

Hypertonic sea water nasal sprays contain natural mineral-rich seawater with sodium chloride concentrations exceeding physiological saline levels. The hyperosmolar environment reduces mucosal edema through osmotic mechanisms while promoting mucociliary transport and secretion clearance. Minerals such as magnesium, calcium, potassium, and bicarbonate may contribute to epithelial repair and reduction in inflammatory mediators[4-5].

Several investigators have suggested that hypertonic saline formulations improve mucociliary function more effectively than isotonic solutions. However, evidence regarding their role as adjuncts to routine pharmacological treatment remains limited, particularly in middle-aged populations with chronic symptoms[6-7].

The present study was therefore designed to compare clinical outcomes between conventional therapy alone and conventional therapy combined with hypertonic sea water nasal spray in adults with CRS.

Aim and Objectives

Aim: To evaluate the effectiveness of hypertonic sea water nasal spray as an adjunct to pharmacological treatment in CRS.

Objectives

1. To compare symptom severity reduction between treatment groups.
2. To evaluate improvement in quality of life using SNOT-22 scores.
3. To assess endoscopic mucosal recovery.
4. To determine patient satisfaction and treatment acceptance.

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Materials and Methods

Present study is Prospective survey-based comparative analytical study, conducted at Department of Otorhinolaryngology. Fifty adult patients diagnosed with CRS.

Inclusion Criteria

- Age between 30 and 50 years.
- Symptoms persisting for more than 12 weeks.
- Diagnosis based on clinical examination and nasal endoscopy.
- Willingness to participate and provide informed consent.

Exclusion Criteria

- Previous sinonasal surgery.
- Nasal polyposis requiring surgery.
- Fungal sinusitis.
- Pregnancy.
- Immunocompromised states.
- Severe septal deviation.
- Malignancy of nose or paranasal sinuses.

Sample Size

The sample size of 50 patients was calculated considering an expected improvement in SNOT-22 score of 20%, power of 80%, and significance level of 5%.

Study Groups

Group A (n=25)

Received conventional pharmacological treatment:

- Intranasal corticosteroids
- Oral antihistamines when indicated
- Mucolytics
- Antibiotics when clinically required

Group B (n=25)

Received:

- Conventional pharmacological treatment
- Hypertonic sea water nasal spray three times daily for eight weeks

The questionnaire included:

1. Frequency of nasal blockage.

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2. Sleep quality.
3. Difficulty in breathing.
4. Need for rescue medications.
5. Work productivity.
6. Overall treatment satisfaction.

Responses were graded on a five-point Likert scale.

Statistical Analysis

Data were analyzed using SPSS version 26. Continuous variables were expressed as mean ± standard deviation while categorical variables were represented as percentages. Student's t-test and Chi-square test were used for comparisons. Statistical significance was considered at $p<0.05$.

Results

Table 1: Baseline Characteristics of Study Participants

Variable	Group A (n=25)	Group B (n=25)	p-value
Mean age (years)	39.8 ± 5.3	40.6 ± 4.9	0.584
Male gender	14 (56%)	15 (60%)	0.771
Duration of symptoms (months)	14.6 ± 5.2	15.1 ± 4.8	0.726
Baseline SNOT-22 score	53.4 ± 8.1	54.1 ± 7.8	0.754
Smokers	7 (28%)	6 (24%)	0.748

Both groups were comparable with respect to age, gender distribution, duration of symptoms, and baseline SNOT-22 scores. No statistically significant baseline differences were observed.

Table 2: Comparison of Clinical Symptom Scores After 8 Weeks

Parameter	Group A	Group B	p-value
Nasal obstruction score	2.4 ± 0.8	1.2 ± 0.5	<0.001
Facial pain score	1.9 ± 0.7	1.0 ± 0.4	<0.001
Postnasal drip score	2.1 ± 0.9	1.1 ± 0.5	0.002
Olfactory dysfunction score	2.5 ± 0.9	1.5 ± 0.6	0.001

Patients receiving adjunctive hypertonic sea water spray demonstrated significantly better symptom reduction. The greatest improvement was noted in nasal obstruction and facial pressure symptoms.

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Table 3: Comparison of SNOT-22 Scores

Assessment Period	Group A	Group B	p-value
Baseline	53.4 ± 8.1	54.1 ± 7.8	0.754
4 weeks	40.8 ± 6.9	31.6 ± 6.2	<0.001
8 weeks	31.6 ± 6.3	22.4 ± 5.1	<0.001
Mean reduction	21.8 ± 5.7	31.7 ± 6.4	<0.001

Patients treated with hypertonic sea water spray showed superior quality of life improvement. Patients in Group B demonstrated nearly 45% greater reduction in symptom burden.

Table 4: Endoscopic Findings and Patient Satisfaction

Outcome	Group A	Group B	p-value
Improvement in mucosal edema	15 (60%)	22 (88%)	0.021
Reduction in nasal secretions	17 (68%)	23 (92%)	0.034
Improved middle meatal patency	16 (64%)	22 (88%)	0.047
Overall patient satisfaction	15 (60%)	22 (88%)	0.021

Adjunctive therapy significantly improved objective endoscopic findings and treatment satisfaction.

Discussion

The current study shows that when taken in conjunction with conventional pharmaceutical treatment, hypertonic sea water nasal spray dramatically improves clinical results in individuals with CRS[8]. The main result was that the adjunctive therapy group's SNOT-22 scores decreased more. Because CRS has been demonstrated to impact daily functioning similarly to chronic systemic disorders including congestive heart failure and chronic obstructive pulmonary disease, improving quality of life is especially crucial.

By generating an osmotic gradient, hypertonic treatments improve sinus drainage and airflow by removing extra fluid from edematous mucosa[9]. Restoring sinus airflow and mucociliary clearance is made easier by a decrease in mucosal edema. Our results of nasal blockage are in accordance with earlier studies that shown quick symptom improvement after administering hypertonic saline. These effects are probably caused by decreased viscosity and increased mucus hydration.

Reduced intranasal inflammatory load and improved drainage of residual secretions may account for the notable reduction in facial pain and pressure. Pressure-related symptoms are reduced when sinus ostial patency is restored.

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Because smell impairment significantly impacts quality of life, the improvement in olfactory dysfunction seen in our study is clinically relevant. Improved olfactory perception most likely resulted from a decrease in mucosal inflammation around the olfactory cleft[10].

Patients receiving hypertonic spray had much less nasal secretions and mucosal edema, according to endoscopic inspection. Participants' subjective reports of symptom reduction are supported by objective improvement[11].

In Group B, patient satisfaction was significantly higher. The majority of participants reported that the spray was simple to administer and that they felt better nasal patency right away. Rates of compliance were higher than 90%[12-4].

Beyond just saline irrigation, the mineral makeup of seawater may provide further advantages. While bicarbonate can lower mucus viscosity and enhance ciliary function, magnesium has anti-inflammatory qualities and may suppress eosinophilic activity[15].

The current results lend credence to the idea that osmotic and mechanical methods enhance rather than replace pharmaceutical interventions. Therefore, hypertonic seawater spraying ought to be considered an additional tactic in all-encompassing CRS control[16].

Strengths of the Study

- Prospective comparative design.
- Use of validated quality of life scoring.
- Inclusion of objective endoscopic outcomes.
- High patient compliance.

Limitations

- Single-center study.
- Relatively small sample size.
- Follow-up limited to eight weeks.
- Radiological outcomes were not evaluated.

Future multicentric studies with larger populations and longer follow-up periods are warranted to determine long-term benefits and recurrence rates.

Conclusion

Hypertonic sea water nasal spray significantly enhances the effectiveness of conventional pharmacological treatment in adults with CRS aged 30–50 years. Patients receiving adjunctive therapy experienced superior symptom control, greater quality of life improvement, improved endoscopic outcomes, and higher treatment satisfaction.

The findings suggest that hypertonic sea water spray is a safe, inexpensive, and effective adjunctive therapy that can be routinely incorporated into CRS management protocols.

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