

## THE EFFECTIVENESS OF NASAL SALINE IRRIGATION IN THE TREATMENT OF CHRONIC RHINOSINUSITIS

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### Introduction

Chronic rhinosinusitis (CRS) is a prevalent condition characterized by persistent inflammation of the nasal and paranasal sinus mucosa lasting more than 12 weeks. It significantly impacts the quality of life due to symptoms such as nasal congestion, facial pain or pressure, postnasal drip, and hyposmia. Management of CRS includes medical therapy, lifestyle modifications, and surgical interventions for refractory cases. Non-surgical approaches remain the first line of treatment, aiming to reduce mucosal inflammation, enhance mucociliary clearance, and alleviate symptoms.

Nasal saline irrigation, a simple and cost-effective therapy, involves the regular flushing of the nasal cavity with isotonic or hypertonic saline solutions. It has been proposed to improve nasal hygiene, remove allergens, inflammatory mediators, and microbial biofilms, and enhance the effectiveness of concomitant topical medications. Despite its widespread clinical use, the effectiveness, optimal frequency, and solution type for nasal saline irrigation in CRS management require systematic evaluation to guide evidence-based practice.

### Objective

The objective of this study is to evaluate the clinical effectiveness of nasal saline irrigation in the management of chronic rhinosinusitis, focusing on symptom relief, mucociliary function improvement, and reduction in the need for pharmacological or surgical interventions. The study also aims to assess patient adherence, tolerability, and potential limitations of nasal saline irrigation in routine clinical practice.

### Materials and Methods

This study utilized a systematic review and analysis of clinical trials, observational studies, and meta-analyses related to nasal saline irrigation in CRS patients. Data sources included PubMed, Cochrane Library, and Scopus, covering studies published between 2000 and 2025. The study population included adult and pediatric patients diagnosed with chronic rhinosinusitis, with or without nasal polyps, undergoing regular nasal saline irrigation as part of non-surgical management.

Intervention types analyzed included isotonic saline (0.9% NaCl), hypertonic saline (1.5–3% NaCl), and variations in delivery methods such as nasal sprays, drops, and high-volume irrigation systems. Outcome measures included symptom score reductions measured by validated scales such as the Sino-Nasal Outcome Test (SNOT-22), improvements in endoscopic and radiologic findings, mucociliary clearance assessment, frequency of acute exacerbations, and patient-reported adherence and satisfaction.

Statistical analysis involved comparative evaluation of pre- and post-intervention outcomes and assessment of clinical significance across different irrigation techniques and solution types.

### Results

Analysis of the reviewed studies demonstrated that nasal saline irrigation significantly improves symptom scores in patients with chronic rhinosinusitis. High-volume irrigations, particularly using isotonic or slightly hypertonic solutions, were associated with the most pronounced reductions in nasal congestion, postnasal drip, and facial discomfort.

Improvement in mucociliary clearance was observed in multiple studies, contributing to enhanced nasal hygiene and reduced bacterial colonization. Patient adherence was generally high due to the non-invasive nature and perceived benefit, although some reported transient discomfort such as nasal irritation or mild epistaxis.

Comparative analyses indicated that hypertonic saline may provide slightly greater symptomatic relief than isotonic solutions but with higher reports of nasal irritation. Nasal irrigation was associated with a reduced need for systemic antibiotics and corticosteroids, highlighting its role in minimizing pharmacological burden. Pediatric studies demonstrated improved symptom management and decreased recurrence of acute infections when nasal irrigation was used consistently.

No serious adverse events were reported across studies, confirming the safety of this intervention.

### Discussion

The findings support the effectiveness of nasal saline irrigation as a non-surgical management strategy for chronic rhinosinusitis. Its benefits are multifactorial, including mechanical clearance of mucus, reduction of inflammatory mediators, improvement in mucociliary function, and facilitation of topical drug delivery.

Regular use enhances symptom control and decreases reliance on systemic therapies, which may reduce long-term side effects. Patient education and technique optimization are critical to achieving maximal benefit, as improper use or inadequate volume may limit effectiveness.

Although hypertonic solutions offer slightly enhanced efficacy, isotonic saline remains better tolerated and is suitable for long-term use. Integration of nasal saline irrigation into standard CRS management protocols can improve quality of life and serve as a preventive measure against exacerbations. Barriers to consistent use include patient perception, availability of irrigation devices, and initial discomfort, which can be addressed through structured guidance and follow-up.

Further research is warranted to define optimal irrigation frequency, solution composition, and long-term adherence strategies in diverse patient populations.

### Conclusion

Nasal saline irrigation is an effective, safe, and well-tolerated non-surgical intervention for chronic rhinosinusitis. It provides significant symptomatic relief, improves mucociliary function, and reduces dependence on systemic medications.

High-volume isotonic or hypertonic irrigation techniques yield the most pronounced benefits, though isotonic solutions offer better long-term tolerability.

Incorporating nasal saline irrigation into routine CRS management enhances patient outcomes, prevents exacerbations, and supports a holistic, non-invasive treatment approach.

Clinicians should educate patients on proper technique, encourage consistent use, and tailor irrigation protocols to individual tolerance and clinical presentation to optimize therapeutic benefits.

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