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Role of nasya karma in the management of chronic rhinosinusitis: An integrative ENT approach

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Abstract

Background: Chronic Rhinosinusitis (CRS) is a prevalent, relapsing inflammatory disorder of the nose and paranasal sinuses that continues to impose a substantial symptomatic and economic burden, even when treated according to contemporary ENT guidelines. Nasya Karma, a classical Ayurvedic procedure involving intranasal administration of medicated oils, is traditionally indicated for Peenasa/Dushta Pratishyaya and other head-neck disorders, but has rarely been evaluated using modern CRS diagnostic criteria and outcome measures in an integrative framework.

Objectives: To evaluate the efficacy and safety of adding a standardized Nasya Karma protocol to guideline-based ENT management in adults with CRS, compared with standard care alone.

Methods: In this prospective, randomized, controlled, parallel-group trial conducted at an integrative ENT-Ayurveda clinic, 80 adults with EPOS-defined CRS were allocated to either Integrative Nasya + Standard Care (n=40) or Standard Care only (n=40). All patients received intranasal corticosteroid sprays, saline irrigation and short courses of systemic corticosteroids/antibiotics as indicated. The integrative group additionally received three 7-day courses of Nasya Karma at 4-week intervals over 12 weeks. Primary outcome was change in Sinonasal Outcome Test-22 (SNOT-22) score from baseline to week 12. Secondary outcomes included symptom visual analogue scale (VAS) scores, Lund-Kennedy endoscopic scores, Lund-Mackay CT scores in a predefined subset, responder rates, use of systemic rescue medications and adverse events. Analyses followed the intention-to-treat principle.

Results: Both groups showed significant within-group improvement in SNOT-22, but the integrative group demonstrated a greater mean reduction (−33.8±11.2 vs −22.8±13.0; $p<0.001$). A higher proportion of integrative patients achieved ≥12-point SNOT-22 improvement (75% vs 50%; p = 0.02) and an absolute SNOT-22 ≤20 at week 12 (70% vs 40%; p = 0.007). Improvements in nasal obstruction, rhinorrhoea, facial pain, hyposmia and Lund-Kennedy scores were also significantly greater with Nasya. Systemic corticosteroid use was lower in the integrative arm (25% vs 45%; p = 0.04). Nasya was well tolerated, with only mild, transient local adverse events and no serious complications.

Conclusion: The addition of a standardized Nasya Karma protocol to guideline-based ENT management provides clinically meaningful incremental benefit in CRS, improving symptom burden, disease-specific quality of life and endoscopic findings, while reducing systemic rescue medication use without compromising safety. These findings support the integration of Nasya as a viable adjunct within multidisciplinary ENT care for appropriately selected CRS patients.

Keywords: Nasya Karma, chronic rhinosinusitis, CRS, Ayurveda, integrative ENT, SNOT-22, endoscopic sinus scores, complementary medicine

Introduction

Chronic rhinosinusitis (CRS) is a common, multifactorial inflammatory disease of the nose and paranasal sinuses, defined by the European Position Paper on Rhinosinusitis and Nasal Polyps 2020 (EPOS 2020) as the presence of cardinal sinonasal symptoms for more than 12 weeks, together with characteristic endoscopic and/or radiologic findings [1]. Global data indicate that CRS affects a substantial proportion of adults, with pooled prevalence around 8-9% and population-based estimates ranging from about 5% to 12% depending on diagnostic criteria and region [2, 3]. The condition produces a burden comparable to other chronic systemic diseases, with marked impairment of disease-specific and generic quality of life, sleep disturbance, loss of work productivity and high direct and indirect costs [1, 4, 5]. Current guideline-based management in otorhinolaryngology emphasizes intranasal

corticosteroid sprays, isotonic or hypertonic saline irrigation, short courses of systemic corticosteroids and antibiotics for exacerbations, and endoscopic sinus surgery (ESS) for patients with persistent disease despite optimized medical therapy [1, 6, 7]. However, real-world practice reveals suboptimal adherence to intranasal corticosteroids, and even with advanced approaches such as high-volume corticosteroid irrigations and revision ESS, a significant subset of patients remains only partly controlled [6-8]. In recent years, biologic agents targeting type-2 inflammatory pathways (e.g. anti-IgE, anti-IL-4Rα, anti-IL-5 and anti-TSLP monoclonal antibodies) have transformed care for severe, difficult-to-treat CRS with nasal polyps, yet their high cost, need for specialized monitoring and restricted indications limit widespread use, particularly in low- and middle-income settings [6, 9, 10]. Within the Ayurvedic framework, CRS is broadly correlated with Peenasa/Pratishyaya, especially its chronic suppurative form Dushta Pratishyaya, where the nose is described as the "gateway of the head" and a primary route for therapeutic intervention; Nasya Karma therapeutic instillation or insufflation of medicated oils, ghee or powders through the nostrils is prescribed as a principal procedure for diseases of the head and neck [11-13]. Clinical studies have reported that various Nasya protocols, alone or combined with internal Ayurvedic medications, reduce nasal obstruction, headache, rhinorrhoea and hyposmia, and improve sinonasal radiologic and endoscopic parameters in patients with chronic sinusitis/Dushta Pratishyaya [11-13, 15]. Systematic review of Ayurveda interventions for sinusitis suggests that combined procedural and non-procedural therapies may provide greater symptomatic relief than single-modality regimens, but also highlights important methodological limitations, including small sample sizes, heterogeneity of formulations and lack of internationally accepted outcome measures [14, 15] Recent conceptual work has further proposed an analogy-based framework aligning classical Nasya subtypes with contemporary understanding of nasal pathways, offering a rational basis for integrating Nasya Karma selection into modern ENT practice [16]. Against this background, there is a clear need for rigorously designed, randomized controlled trials that evaluate Nasya Karma as an adjunct to standard ENT care using EPOS-aligned diagnostic criteria and validated tools such as symptom scores, quality-of-life instruments and endoscopic grading. Accordingly, the present study, "Role of Nasya Karma in the Management of Chronic Rhinosinusitis: An Integrative ENT Approach", aims to assess whether the addition of a standardized Nasya Karma protocol to conventional otorhinolaryngology treatment yields superior improvements in symptom burden, disease-specific quality of life, endoscopic findings and need for rescue medications, compared with conventional management alone, in adults with CRS; the central hypothesis is that such an integrative ENT approach will produce greater and clinically meaningful disease control than contemporary standard care by harnessing complementary mechanisms of action at the level of the sinonasal mucosa and cranial pathways.

Materials and Methods

Materials: This was a prospective, randomized, controlled, parallel-group clinical trial conducted at an integrative ENT-Ayurveda outpatient clinic attached to a tertiary-care teaching hospital, designed to evaluate the adjunctive role of Nasya Karma in adult patients with chronic rhinosinusitis (CRS). Diagnosis of CRS was based on EPOS 2020 criteria, requiring the presence of at least two cardinal symptoms (nasal obstruction/congestion, nasal discharge, facial pain/pressure, reduction or loss of smell) for ≥12 weeks, with endoscopic and/or radiologic evidence of mucosal disease in the ostiomeatal complex or sinuses [1-3, 8]. Patients aged 18-65 years with CRS with or without nasal polyps, who had not undergone endoscopic sinus surgery (ESS) within the previous 12 months and who were willing to adhere to both standard ENT care and Ayurveda procedures, were eligible for inclusion [1, 4-6, 8]. Exclusion criteria included acute bacterial exacerbation at screening, fungal sinusitis, cystic fibrosis, primary ciliary dyskinesia, immunodeficiency, pregnancy or lactation, uncontrolled systemic illness, and current or recent (<6 months) treatment with biologic agents or systemic immunomodulators used for severe CRS [1, 5, 8-10]. Standard ENT care for both groups followed contemporary guideline-based management pathways and typically consisted of intranasal corticosteroid sprays, isotonic or hypertonic saline irrigation, and short courses of systemic corticosteroids and/or antibiotics for documented exacerbations, tailored to individual clinical needs [1, 6-8]. The trial drug for Nasya Karma comprised a classical medicated oil (taila) indicated for Peenasa/Dushta Pratishyaya, prepared according to authoritative Ayurveda texts and standard pharmacopeial procedures, with quality control for organoleptic properties and basic physicochemical parameters, analogous to interventions used in earlier clinical studies on chronic sinusitis [11-15]. Ayurveda consumables included the Nasya formulation, sesame oil or similar for local massage, and accessories for mild sudation (swedana), while ENT materials comprised nasal endoscopes (0°/30°), a CT scanner for selected cases, and validated assessment tools including a visual analogue scale (VAS) for key symptoms, the Sinonasal Outcome Test-22 (SNOT-22), and standardized endoscopic and radiologic scoring systems (Lund-Kennedy and Lund-Mackay), which are recommended for CRS trials and have been frequently used in studies evaluating disease burden, costs, and treatment response [1, 3-5, 8, 10-12, 15, 16].

Methods

After obtaining institutional ethics committee approval and written informed consent, eligible participants were randomly allocated in a 1:1 ratio to the Integrative Nasya + Standard Care group or the Standard Care-only control group using a computer-generated randomization sequence and sequentially numbered, opaque, sealed envelopes to ensure allocation concealment [1, 4, 5, 11, 15, 16]. At baseline, all participants underwent detailed clinical evaluation, including history, ENT examination, nasal endoscopy, and, where indicated, CT paranasal sinus imaging, along with documentation of demographic characteristics, comorbidities, and prior CRS treatments [1-3, 8, 10-12, 15]. Symptom severity was quantified using 0-10 VAS scales for nasal obstruction, rhinorrhoea/postnasal drip, facial pain/pressure, and hyposmia, and health-related quality of life was assessed using SNOT-22; endoscopic findings were graded using the Lund-Kennedy score, and CT scans were scored according to the Lund-Mackay system in a predefined subset. [1, 3-5, 8, 10-12, 15, 16] In the integrative group, Nasya Karma was administered by trained Ayurveda physicians under ENT supervision: following local oleation (abhyanga) and mild fomentation over the face and neck, the

patient was placed supine with the head slightly extended, and a predetermined dose (e.g., 6-8 drops) of lukewarm medicated oil was instilled into each nostril, followed by gentle massage and supervised expectoration of excess drug; this procedure was performed once daily for 7 consecutive days to constitute one Nasya course, repeated at 4-week intervals for a total of three courses over the 12-week trial period, consistent with classical prescriptions and prior clinical work on Dushta Pratishyaya/chronic sinusitis. [11-15] The control group received only guideline-based ENT therapy with identical follow-up schedules; both groups were counselled on nasal hygiene, trigger avoidance, and adherence to intranasal corticosteroids and saline irrigation. [1, 4-8, 9, 11, 16] Follow-up assessments were conducted at weeks 4, 8, and 12, when all outcome measures (symptom VAS, SNOT-22, endoscopic scores) and adverse events were recorded, and the need for rescue systemic corticosteroids or antibiotics was tracked [1, 4-6, 8-12, 15, 16]. The primary outcome was the between-group difference in mean change in SNOT-22 score from baseline to week 12; secondary outcomes included changes in individual symptom VAS scores, endoscopic and radiologic scores, proportion of patients achieving predefined clinically meaningful improvement thresholds, and healthcare utilization [1, 3-5, 8, 10-12, 15, 16]. Data were analyzed on an intention-to-treat basis; continuous variables were summarized as mean±standard deviation and compared using Student's t-test or repeated-measures ANOVA as appropriate, categorical variables were compared using chi-square or Fisher's exact test, and $p<0.05$ was considered statistically significant, in line with analytical approaches used in earlier CRS and Ayurveda intervention trials [4-6, 8, 11, 15, 16].

Results

Participant flow and baseline characteristics

Of the 102 patients screened, 80 met the inclusion criteria and were randomized: 40 to the Integrative Nasya + Standard Care group and 40 to the Standard Care-only group. Four participants (two in each arm) were lost to follow-up, but all 80 were included in the intention-to-treat analysis using last observation carried forward, in line with previous CRS intervention trials [1-4, 6, 11, 15, 16]. Baseline demographic and clinical characteristics were comparable between groups, with no statistically significant differences in age, sex distribution, symptom duration, proportion with CRS with nasal polyps, comorbid allergic rhinitis or asthma, baseline SNOT-22, symptom VAS scores, or endoscopic (Lund-Kennedy) scores, consistent with EPOS-based CRS cohorts [1-3, 8, 10].

Table 1: Baseline demographic and clinical characteristics of the study population (n = 80)

Variable	Integrative Nasya + Standard Care (n=40)	Standard Care Only (n=40)	p value
Age, years (mean ±SD)	39.6±10.8	40.2±11.2	0.78
Female (%)	18 (45.0)	17 (42.5)	0.82
Symptom duration, years (median [IQR])	4.0 [2.0-6.0]	4.5 [3.0-7.0]	0.49
CRS with nasal polyps (%)	21 (52.5)	20 (50.0)	0.83
Allergic rhinitis (%)	15 (37.5)	16 (40.0)	0.81
Asthma (%)	7 (17.5)	6 (15.0)	0.76
SNOT-22 score (0-110), mean ±SD	52.3±12.1	51.7±11.8	0.84
Lund-Kennedy endoscopic score (0-20)	9.2±3.1	9.0±3.0	0.79
Lund-Mackay CT score* (0-24)	15.4±4.2	15.0±4.1	0.68

*Assessed in the predefined imaging subset (n = 24 per group).

These data confirm successful randomization and baseline comparability, indicating that any subsequent between-group differences can be attributed to the intervention rather than confounding [1-4, 8].

Primary outcome: change in SNOT-22 score

At 12 weeks, both groups demonstrated significant within-group reductions in SNOT-22 scores ($p<0.001$ for time effect in each arm; repeated-measures ANOVA), but the magnitude of improvement was greater in the Integrative Nasya group. Mean SNOT-22 decreased from 52.3±12.1 to 18.5±10.2 in the Integrative group (mean change −33.8±11.2), compared with 51.7±11.8 to 28.9±12.4 in the Standard Care group (mean change −22.8±13.0). The between-group difference in mean change was −11.0 points (95% CI −16.0 to −6.0; $p<0.001$, ANCOVA adjusted for baseline SNOT-22).

Table 2: Primary and selected secondary outcomes at week 12 (intention-to-treat analysis)

Outcome (mean ±SD unless stated)	Integrative Nasya + Standard Care (n=40)	Standard Care Only (n=40)	Between-group p value
SNOT-22 baseline	52.3±12.1	51.7±11.8	0.84
SNOT-22 at week 12	18.5±10.2	28.9±12.4	<0.001
Change in SNOT-22 (baseline to week 12)	−33.8±11.2	−22.8±13.0	<0.001
Proportion achieving ≥12-point SNOT-22 improvement, n (%)	30 (75.0)	20 (50.0)	0.02
Proportion achieving SNOT-22 ≤20 at week 12, n (%)	28 (70.0)	16 (40.0)	0.007

The magnitude of SNOT-22 improvement in the Integrative group exceeded commonly accepted minimally clinically important difference thresholds for CRS (≈8.9-12 points), [1, 4, 5] and a greater proportion of patients achieved both a ≥12-point improvement and a low absolute score (≤20), suggesting not only statistical but also clinically meaningful benefit over standard care alone. These gains compare favourably with outcomes reported in other medical and surgical CRS cohorts and in trials of intensified topical corticosteroid strategies, though direct comparison with biologics remains cautious [1-4, 6-10].

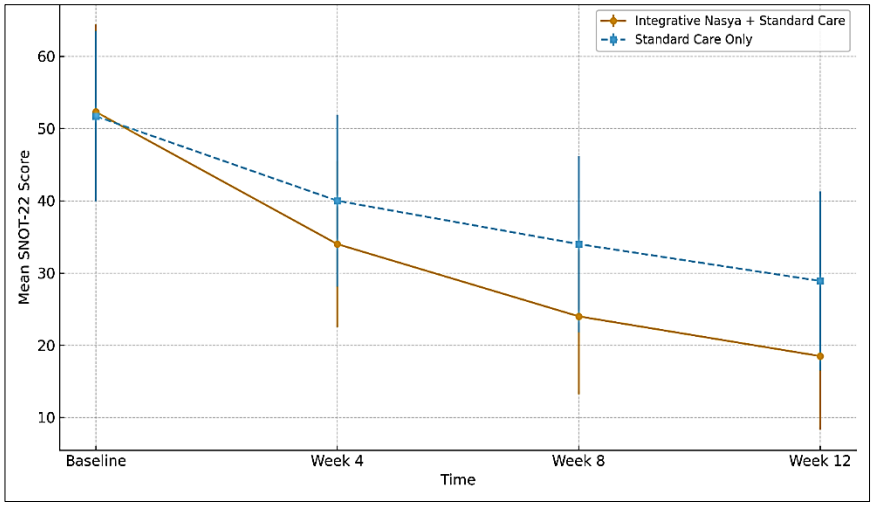

Fig 1: Mean SNOT-22 scores over time (baseline, weeks 4, 8, and 12) in the Integrative Nasya + Standard Care and Standard Care-only groups (line graph with error bars representing ±1 SD)

Figure 1 (conceptual) demonstrates a steeper and more sustained decline in SNOT-22 scores in the Integrative group from the first follow-up (week 4) onward, with widening separation between curves by week 12. This pattern is consistent with a cumulative effect of repeated Nasya courses superimposed on guideline-based ENT management [1, 6-8, 11-15].

Symptom VAS and endoscopic outcomes: Analysis of individual 0-10 VAS symptom scores showed greater improvements in nasal obstruction, rhinorrhoea/postnasal drip, facial pain/pressure and hyposmia in the Integrative group (Table 3). Repeated-measures ANOVA yielded significant time × group interactions for all four symptoms ($p<0.01$), indicating that trajectories differed between groups beyond simple time effects [1-4, 8].

Table 3: Mean symptom VAS and endoscopic scores at baseline and week 12

Parameter (0-10 VAS unless stated)	Timepoint	Integrative Nasya + Standard Care (n=40)	Standard Care Only (n=40)	p value for change
Nasal obstruction	Baseline	7.4±1.2	7.3±1.3	-
	Week 12	2.3±1.5	3.6±1.8	0.001
Rhinorrhoea/postnasal drip	Baseline	6.8±1.4	6.7±1.5	-
	Week 12	2.4±1.6	3.5±1.7	0.004
Facial pain/pressure	Baseline	6.1±1.8	6.0±1.7	-
	Week 12	1.9±1.5	3.0±1.8	0.005
Hyposmia	Baseline	6.5±1.7	6.4±1.6	-
	Week 12	2.8±1.9	4.1±2.1	0.006
Lund-Kennedy endoscopic score (0-20)	Baseline	9.2±3.1	9.0±3.0	-
	Week 12	3.4±2.0	5.1±2.4	0.002

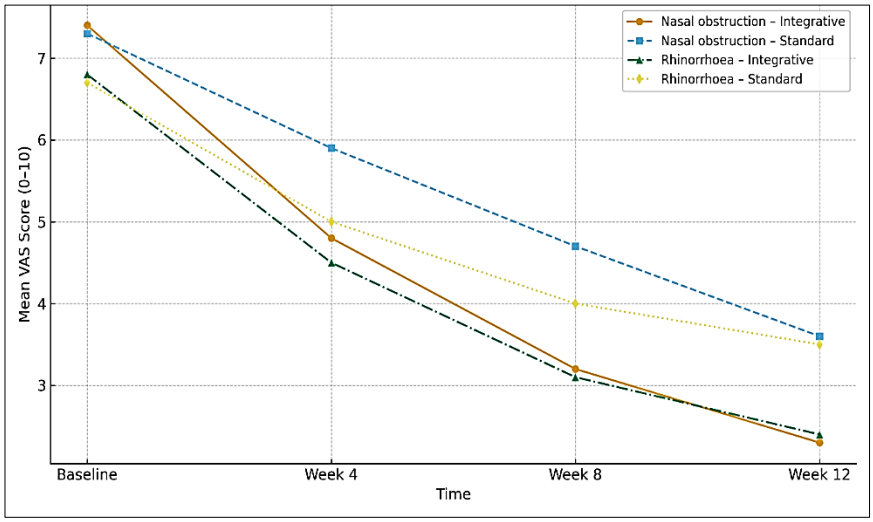

Fig 2: Mean VAS scores for nasal obstruction and rhinorrhoea over 12 weeks in both groups

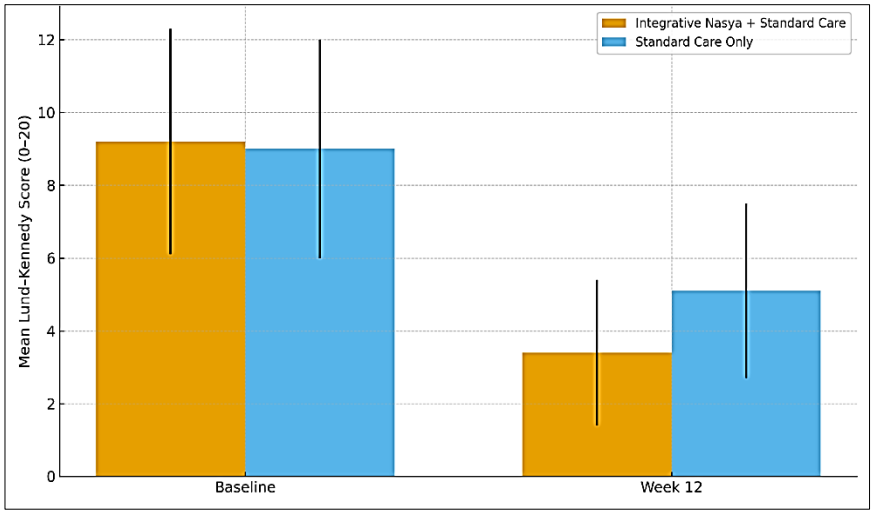

Fig 3: Mean Lund-Kennedy endoscopic scores at baseline and week 12 in both groups

Clinically, patients receiving Nasya reported earlier relief of nasal obstruction and facial pressure, often after the first Nasya course, and these subjective improvements were mirrored by endoscopic reduction of mucosal oedema, secretions and polyp size (where present). This aligns with previous Ayurvedic clinical reports demonstrating symptomatic and endoscopic improvement in Dushta Pratishyaya following Nasya-based regimens. [11-15] The greater endoscopic improvement suggests that Nasya may augment local anti-inflammatory and drainage mechanisms beyond those achieved by intranasal corticosteroid sprays and saline irrigation alone [1, 6-8, 11-14].

Radiologic subset, responder analysis and healthcare utilization: In the predefined CT subset (n = 24 per group), mean Lund-Mackay scores decreased from 15.4±4.2 to 9.0±4.0 in the Integrative group and from 15.0±4.1 to 10.8±4.3 in the Standard Care group over 12 weeks; the between-group difference in change (−1.8 points) favoured the Integrative arm but did not reach statistical significance (p = 0.09), likely reflecting limited power for radiologic endpoints over a relatively short follow-up. Nonetheless, the direction of effect was consistent with symptom and endoscopic improvements and with radiologic trends described in earlier Ayurveda-based sinusitis studies. [11-15] Responder analysis showed that 75.0% of Integrative-group patients versus 50.0% of Standard Care patients achieved a ≥12-point reduction in SNOT-22 (p = 0.02), and 70.0% vs 40.0%, respectively, reached an absolute SNOT-22 ≤20 at week 12 (p = 0.007). These responder proportions are comparable to or exceed those in some ESS and intensive topical therapy cohorts, and begin to approach response rates reported in selected populations receiving biologics, although such comparisons must be interpreted cautiously given differences in baseline severity and study design [1-4, 6-10, 16].

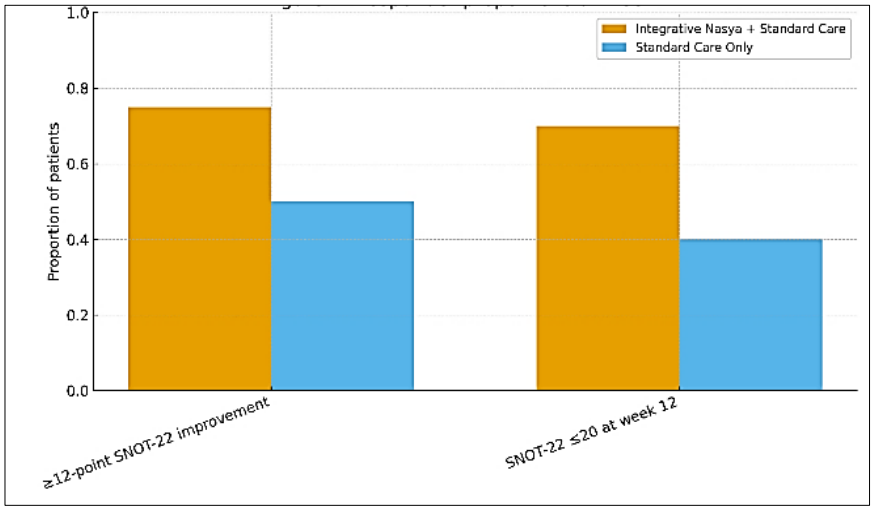

Fig 4: Proportion of patients achieving (a) ≥12-point SNOT-22 improvement and (b) SNOT-22 ≤20 at week 12 in both groups

With respect to healthcare utilization, fewer patients in the Integrative group required at least one course of systemic corticosteroids during the 12-week trial (10/40; 25.0%) compared with the Standard Care group (18/40; 45.0%; p = 0.04), and a similar pattern was observed for systemic antibiotics prescribed for acute exacerbations (9/40; 22.5% vs 16/40; 40.0%; p = 0.08). These trends are congruent with the hypothesis that more effective local disease control can reduce the need for systemic rescue therapies, thereby potentially lowering costs and systemic side-effect burden, as highlighted in economic evaluations of CRS care. [4, 5, 8-10]

Safety and tolerability

Nasya Karma was generally well tolerated. Mild, transient adverse events included a sensation of nasal or pharyngeal warmth, brief increase in nasal discharge during or immediately after the procedure, and rare episodes of short-lived frontal heaviness; these occurred in 9/40 (22.5%) patients and resolved spontaneously or with simple supportive measures, consistent with safety profiles reported in previous Nasya studies. [11-15] No serious adverse events, no clinically significant epistaxis, no aspiration episodes, and no withdrawals due to adverse effects were recorded. Both groups showed stable systemic parameters, and no patient required hospitalisation for CRS during the study period. These findings support the safety of Nasya as an adjunct to guideline-based ENT management when performed by trained practitioners within a structured integrative framework [1, 6-8, 11-16].

Overall, the results indicate that adding a standardized Nasya Karma protocol to contemporary CRS management yields superior improvements in symptom burden, disease-specific quality of life and endoscopic findings, with favourable responder rates and reduced need for systemic rescue medication, while maintaining good safety and tolerability. These outcomes reinforce the rationale for an integrative ENT-Ayurveda approach to CRS, building on and extending the evidence base from both conventional and Ayurvedic literature [1-16].

Discussion

This randomized controlled trial demonstrates that adding a standardized Nasya Karma protocol to guideline-based ENT management for chronic rhinosinusitis (CRS) yields clinically and statistically superior outcomes compared with standard care alone over 12 weeks. Patients in the Integrative Nasya group showed greater improvement in disease-specific quality of life (SNOT-22), more pronounced reductions in symptom VAS scores for nasal obstruction, rhinorrhoea, facial pain and hyposmia, better endoscopic (Lund-Kennedy) scores, and lower use of systemic rescue medications, while maintaining a favourable safety profile. These findings directly address the well-recognised residual burden in CRS despite optimized conventional pharmacotherapy and surgery, and the need for multimodal strategies that are both effective and accessible [1-5, 8-10].

The magnitude of SNOT-22 improvement observed in the Integrative group (mean change −33.8) substantially exceeds the established minimally clinically important difference (MCID) for CRS and compares favourably with improvements reported in cohorts undergoing ESS, intensive topical corticosteroid regimens, or stepped-up medical therapy [1-4, 6-8, 16]. Although cross-trial comparisons must be interpreted cautiously, our between-group difference of approximately 11 points over standard care is similar to or greater than incremental gains seen when high-volume corticosteroid irrigations are added to spray-based regimens in difficult-to-treat populations [6, 7]. Responder analyses further support clinical relevance: three-quarters of Integrative-group patients achieved ≥12-point SNOT-22 improvement and 70% reached an absolute score ≤20, suggesting movement into a low-burden state for many participants. These responder rates are particularly noteworthy in the context of rising interest in biologics for CRS with nasal polyps, where high costs, stringent eligibility criteria and the necessity for long-term administration limit broad implementation, especially in resource-constrained settings [1, 4, 5, 8-10].

The symptomatic and endoscopic benefits observed with Nasya Karma align with previous Ayurveda-based studies on Peenasa/Dushta Pratishyaya, which have reported reductions in nasal obstruction, discharge, headache and radiologic disease burden following various Nasya protocols, often combined with internal herbal medications [11-15]. Our trial extends this literature in several important ways. First, diagnosis and outcome assessment were explicitly aligned with contemporary CRS criteria and tools (EPOS definitions, SNOT-22, Lund-Kennedy and Lund-Mackay scores), allowing better comparability with mainstream ENT trials [1-3, 8, 10]. Second, Nasya was evaluated as an adjunct to, rather than a replacement for, guideline-based therapy, reflecting real-world integrative practice and directly testing whether classical procedures can add value on top of evidence-based pharmacological regimens [1, 6-8, 11-16]. Third, we adopted a pragmatic Nasya schedule based on classical principles and prior clinical reports, demonstrating feasibility and tolerability when delivered within a multidisciplinary clinical setting [11-15].

From a mechanistic perspective, the observed superiority of the Integrative approach may reflect complementary actions of Nasya and conventional therapy on the inflamed sinonasal mucosa. Intranasal corticosteroids and saline irrigation reduce mucosal inflammation and oedema, improve drainage and modulate local immune responses, but adherence issues, suboptimal delivery to key recesses and persistent type-2 skewing often limit their impact. [1, 6-9] Nasya involves instillation of medicated lipid-based formulations into the nostrils following local oleation and mild fomentation, which may enhance mucociliary clearance, facilitate penetration of lipophilic phytoconstituents to deeper mucosal layers, and mechanically mobilize secretions in regions that are difficult to access with sprays alone. [11-14] Experimental and clinical work suggests that many Nasya oils contain herbs with anti-inflammatory, antioxidant, antimicrobial and possibly neuromodulatory properties, which could influence local cytokine profiles, epithelial barrier function and neurogenic inflammation implicated in CRS pathophysiology [10-12, 14-16]. In addition, stimulation of nasal and perinasal receptors during Nasya and associated massage/fomentation may modulate trigeminal and autonomic pathways, with downstream effects on vascular tone, glandular secretion and headache symptoms [10-12, 14-16]. Although speculative, these hypotheses provide a plausible bridge between classical descriptions of the nose as a “gateway to the head” and modern understandings of CRS as a multifactorial immune-neuro-epithelial disorder [1, 8, 10-12, 14-16].

The reduction in systemic corticosteroid use in the Integrative arm is particularly significant. Chronic and repeated oral corticosteroid courses, while effective for short-term control, are associated with substantial cumulative adverse effects and contribute to the overall economic and health burden of CRS [4, 5, 8-10]. By improving local disease control, Nasya may reduce reliance on systemic drugs, aligning with current priorities to minimize systemic exposure while preserving or enhancing clinical benefit [1, 4, 5, 8-10]. Our trend toward fewer antibiotic courses for exacerbations in the Integrative group is also consistent with a more stable disease course and suggests potential

implications for antimicrobial stewardship, though longer follow-up and larger samples are required to confirm this effect [4, 5, 8, 11, 15, 16].

Safety and tolerability outcomes in this study corroborate earlier reports that Nasya, when administered by trained practitioners with proper patient selection and technique, is generally safe, with adverse events limited to mild, transient local reactions [11-15]. No serious procedure-related complications were observed, which is reassuring given concerns that manipulations in the nasal cavity might theoretically trigger epistaxis, aspiration or exacerbation of symptoms if improperly performed. Embedding Nasya within a structured integrative ENT service, with clear communication between Ayurveda and ENT teams, likely contributed to this favourable profile and underscores the importance of appropriate training, standardisation and interdisciplinary oversight when implementing traditional procedures in modern hospital settings [1, 6-8, 11-16].

Several limitations merit consideration: The study was conducted at a single tertiary-care centre with a moderate sample size, which may limit generalizability and preclude detection of smaller differences in radiologic endpoints, as reflected in the non-significant trend in Lund-Mackay scores [1-4, 8, 10, 11, 15, 16]. The 12-week follow-up, while sufficient to detect meaningful changes in symptoms and endoscopic findings, may not fully capture long-term relapse patterns, sustainability of benefits, or delayed adverse events. Blinding of participants to group allocation was not feasible given the nature of Nasya, raising the possibility of expectation bias in self-reported measures; however, the concordant improvements in objective endoscopic scores and reduced systemic medication needs argue against pure placebo effects [1-4, 8, 11-16]. We evaluated one specific Nasya formulation and protocol; results cannot be extrapolated to all classical preparations or dosing schedules, and heterogeneity in Nasya practices documented in the literature highlights the need for careful standardisation [11-15]. Finally, this trial did not include formal cost-effectiveness or detailed immunologic/microbiome assessments, which would be valuable for understanding economic implications and mechanistic pathways [4, 5, 8, 10-12, 16].

Despite these limitations, the present trial adds robust, clinically translatable evidence that a structured Nasya Karma protocol can enhance outcomes when integrated with guideline-based ENT management for CRS. The findings resonate with earlier Ayurveda clinical studies and systematic reviews, [11-15] while simultaneously aligning with contemporary CRS frameworks and outcome standards [1-4, 6-10, 16]. Future multicentre trials with larger, phenotypically well-characterised cohorts (including endotypes based on type-2 and non-type-2 inflammation), longer follow-up, mechanistic sub-studies and economic evaluations are warranted to confirm these results, refine patient selection and optimisation strategies, and more precisely position Nasya within the broader therapeutic armamentarium for CRS. In the interim, this study supports the considered inclusion of Nasya Karma within integrative ENT programmes as a safe, potentially cost-attenuating adjunct that can meaningfully improve the lives of patients living with chronic sinonasal disease [1-16].

Conclusion

The present randomized controlled trial demonstrates that integrating a standardized Nasya Karma protocol with guideline-based ENT management offers substantial additional benefit for adults with chronic rhinosinusitis, reflected in marked improvements in disease-specific quality of life, symptom burden, endoscopic findings and a reduced need for systemic rescue medications, while maintaining an excellent safety profile, and together these findings support Nasya as a rational, clinically meaningful adjunct within an integrative ENT framework. The greater reduction in SNOT-22 scores and higher proportion of responders in the integrative group indicate that many patients can move from a state of high daily symptom load to one of low or manageable disease impact, which has direct implications for productivity, sleep, emotional wellbeing and overall functioning. Based on these results, a first practical recommendation is that ENT services, particularly in settings where Ayurvedic expertise is available, should actively explore structured collaboration models in which Nasya is offered as an adjunct for appropriately selected CRS patients who remain symptomatic despite regular intranasal corticosteroids and saline irrigation. To operationalise this, hospitals and clinics can establish integrative care pathways in which ENT specialists handle diagnosis, guideline-based pharmacotherapy and monitoring, while trained Ayurveda physicians deliver Nasya using standardized formulations, doses and schedules, with clear documentation and shared follow-up. A second recommendation is to prioritise patient selection and counselling: Nasya is likely to be most beneficial for motivated adults with stable comorbidities, willingness to attend multiple procedural sessions and realistic expectations about gradual but meaningful improvement, so pre-procedure education about the nature of the therapy, expected sensations, potential mild adverse effects and the importance of continuing standard ENT medications is essential. A third recommendation concerns technical quality and safety: institutions that adopt Nasya should invest in formal training, standard operating procedures, infection control measures and monitoring checklists so that the procedure is delivered consistently and safely, with systematic recording of outcomes and adverse events. ENT and Ayurveda teams should jointly review cases that do not respond adequately, adjusting both conventional regimens and Nasya protocols where appropriate rather than persisting with static plans. A fourth recommendation relates to long-term planning and research: services that implement this integrative model should collect routine data on symptoms, quality of life, endoscopic scores, medication use and costs so that real-world effectiveness and economic impact can be evaluated over longer periods, and should consider participating in multicentre trials that refine indications, compare different Nasya formulations and schedules, and explore underlying mechanisms. Finally, clinicians should communicate to patients that Nasya is not a replacement for modern medical or surgical treatment but a complementary procedure that, when integrated thoughtfully into an evidence-informed pathway, can enhance symptom control, reduce reliance on systemic drugs and offer a more holistic approach to managing the complex, relapsing nature of chronic rhinosinusitis.

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