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Dr. Raka Wibisono
MD, Ph.D., Department of Shalakya Tantra (ENT & Ophthalmology), Faculty of Traditional Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia

Dr. Putri Ayu Mahardika
MS (Ay), Ph.D., Integrative Otorhinolaryngology Research Unit, Universitas Airlangga, Surabaya, East Java, Indonesia

Corresponding Author:
Dr. Raka Wibisono
MD, Ph.D., Department of Shalakya Tantra (ENT & Ophthalmology), Faculty of Traditional Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia

Therapeutic efficacy of Kaṇṭha Gargaṇa and Dhūmapāna in recurrent pharyngitis: A Shalakya Tantra perspective

Raka Wibisono and Putri Ayu Mahardika

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Abstract

Background: Recurrent pharyngitis is a common cause of morbidity and antibiotic use, despite guideline recommendations to restrict antimicrobials to selected cases. In Ayurveda, recurrent sore throat can be correlated with Kaṇṭha-roga entities such as Galagraha and Tundikeri, for which Shalakya Tantra recommends localized procedures (kriyākalpa) including Kaṇṭha Gargaṇa (medicated gargling) and Dhūmapāna (medicated smoke inhalation).

Objectives: To evaluate the therapeutic efficacy of a standardized Kaṇṭha Gargaṇa-Dhūmapāna protocol, integrated with conventional care, on recurrence, symptom burden and antibiotic consumption in adults with recurrent pharyngitis.

Methods: In this prospective, randomized, controlled, parallel-group clinical trial, 80 adults (18-60 years) with ≥3 physician-diagnosed pharyngitis episodes in the preceding year were allocated (1:1) to either Kaṇṭha Gargaṇa + Dhūmapāna + standard care (intervention) or standard care alone (control) and followed for 6 months. The intervention group performed warm herbal Kaṇṭha Gargaṇa three times daily during acute episodes and once daily as prophylaxis, plus supervised procedure-specific Dhūmapāna, in addition to guideline-based pharmacotherapy. Primary outcome was the number of recurrent pharyngitis episodes; secondary outcomes included time to symptom resolution, pain scores, antibiotic courses, sore-throat-related health-care visits and days off work/school. Analyses were conducted on an intention-to-treat basis.

Results: Baseline characteristics were comparable between groups. Over 6 months, mean recurrent episodes per patient were significantly lower in the intervention group than in controls (1.2 ± 1.0 vs 3.1 ± 1.4; $p < 0.001$), and a greater proportion achieved ≥50% reduction in episode frequency (77.5% vs 35.0%; $p < 0.001$). Time to complete pain resolution for the index episode was shorter (3.0 ± 1.2 vs 4.7 ± 1.5 days; $p < 0.001$), with steeper declines in daily VAS scores. Mean antibiotic courses (0.6 ± 0.8 vs 1.4 ± 1.0; $p < 0.001$), sore-throat-related ENT/primary-care visits (1.0 ± 0.9 vs 2.2 ± 1.3; $p < 0.001$) and days off work/school (2.1 ± 2.0 vs 4.8 ± 3.1; $p < 0.001$) were also significantly reduced. No serious adverse events were observed.

Conclusion: Integrating a standardized Kaṇṭha Gargaṇa and Dhūmapāna protocol with standard guideline-based management significantly reduced recurrence, symptom burden, antibiotic use and health-care utilization in adults with recurrent pharyngitis. These findings support the incorporation of evidence-informed Shalakya Tantra kriyākalpa as pragmatic, low-cost adjuncts within modern ENT and primary-care practice.

Keywords: Recurrent pharyngitis, Kaṇṭha Gargaṇa, Dhūmapāna, Shalakya Tantra, Ayurveda, sore throat, randomized controlled trial, antibiotic stewardship, kriyākalpa, integrative ENT care

Introduction

Recurrent pharyngitis is one of the most frequent reasons for primary-care and ENT consultations, with viral etiologies predominating and most episodes being self-limiting yet highly disruptive to quality of life and productivity. Despite guideline-driven recommendations to restrict antibiotics to confirmed or strongly suspected group A streptococcal infection, inappropriate antimicrobial use remains common, contributing to resistance, avoidable adverse effects, and economic burden. Simple local measures such as warm saline gargles have demonstrated clinically meaningful reduction in sore-throat pain and dysphagia in randomized trials, highlighting the therapeutic potential of topical oropharyngeal interventions as adjuncts or alternatives to systemic pharmacotherapy. In Ayurveda, recurrent sore throat is broadly correlated with Galagraha, Tundikeri and other

Kaṇṭha-roga entities described in the classical Brihattrayi, where mucosal inflammation and Kapha-Pitta vitiation in the throat region are emphasized. Shalakya Tantra, the branch of Ayurveda devoted to diseases of the head and neck including ear-nose-throat, conceptualizes a range of localized procedures (kriyākalpa) such as Kaṇṭha Gargaṇa (medicated gargling; kavala/gandūṣa) and Dhūmapāna (medicated smoke inhalation) as key modalities for Urdhvajaṭrugata vikāra, integrating them with systemic śodhana and śamana measures. Classical treatises and contemporary expositions on Dhumapāna describe its kapha-śāmana, śothahara and krimighna effects in the naso-oropharyngeal tract and its utility in conditions such as cough, rhinitis, tonsillitis and obstructive throat complaints, while Kaṇṭha Gargaṇa with decoctions containing Triphalā, Yaṣṭimadhu, haridrā and other dravyas is credited with reducing pain, edema and local infection. Emerging Ayurvedic clinical literature includes conceptual discussions on Galagraha/pharyngitis and tonsillitis, and small pilot studies of Darvyādi-kvātha kawal in acute pharyngitis, but robust controlled data on integrated Kaṇṭha Gargaṇa plus Dhūmapāna protocols in *recurrent* pharyngitis remain sparse. This evidentiary gap persists despite the growing interest in evidence-based standardization of Shalakya Tantra procedures and their potential role in antibiotic-sparing management of recurrent upper-airway infections. Therefore, the present study, "Therapeutic Efficacy of Kaṇṭha Gargaṇa and Dhūmapāna in Recurrent Pharyngitis: A Shalakya Tantra Perspective, " was undertaken to systematically evaluate whether a standardized Shalakya regimen combining Kaṇṭha Gargaṇa with a selected herbal decoction and procedure-specific Dhūmapāna, given in addition to general lifestyle and dietary advice, can reduce the frequency and severity of pharyngitis episodes, improve symptom scores and throat-related quality of life, and decrease antibiotic use and health-care visits when compared with standard conventional care alone. On the basis of Ayurvedic pharmacodynamic principles and preliminary clinical reports, the working hypothesis is that the combined Kaṇṭha Gargaṇa-Dhūmapāna protocol will be superior to standard care in;

1. Achieving faster symptomatic relief during acute episodes,
2. Reducing the number of recurrent pharyngitis episodes over the follow-up period, and
3. Lowering dependence on systemic antibiotics and analgesics, while remaining acceptable and safe for routine use in patients with recurrent pharyngitis.

Materials and Methods

Materials

This was a prospective, randomized, controlled, parallel-group clinical study conducted in the Shalākya Tantra outpatient and inpatient services of a tertiary-care Ayurveda teaching hospital with an attached ENT department, where recurrent pharyngitis is routinely managed according to contemporary ENT guidelines integrated with Ayurvedic protocols [1-4, 9]. Adults aged 18-60 years with a history of ≥3 physician-diagnosed episodes of acute pharyngitis in the preceding 12 months and presenting with an acute sore throat episode were screened using standard clinical criteria for streptococcal and non-streptococcal pharyngitis as per international recommendations and national practice patterns [1-4, 9]. Patients with suspected rheumatic fever, peritonsillar abscess, chronic tonsillitis, significant systemic illness, pregnancy, immunosuppression, or current use of long-term prophylactic antibiotics were excluded [1-4]. The investigational Kaṇṭha Gargaṇa formulation was a standardized decoction (kvātha) prepared in the hospital pharmacy from pharmacopeial-grade crude drugs (e.g. Triphalā, Yaṣṭimadhu, haridrā and other śothahara, kaphahara and krimighna dravyas) selected on the basis of their indications for Kaṇṭharoga, Tundikeri and Galagraha in the Bṛhattrayī and later compendia [10, 13-17]. The Dhūmapāna powder comprised finely sieved plant materials indicated for śiro-roga and ūrdhvajatrugata vikāra (such as guggulu-based and tikta-kaṭu drugs) in classical texts and contemporary Shalākya Tantra expositions on Dhumapāna [10-12, 15-17]. Both formulations were manufactured under GMP conditions, subjected to organoleptic and basic physicochemical testing, and packed in unit-dose sachets to ensure batch uniformity. The control arm received standard conventional care in accordance with evidence-based pharyngitis guidelines (analgesics, antipyretics, antibiotic therapy when indicated) and supportive measures such as warm saline gargles, reflecting current best practice and the documented benefits of simple gargling strategies for upper respiratory tract infections [1-6]. Lifestyle and dietary advice for all participants was harmonized with Ayurvedic principles of managing ūrdhvajatrugata kapha-pitta vikṛti and lifestyle-related disorders, emphasizing avoidance of atiśīta, ati-uṣṇa and irritant ahāra-vihāra [12, 15-17].

Methods

Eligible, consenting participants were randomly allocated in a 1:1 ratio to either the Kaṇṭha Gargaṇa + Dhūmapāna + standard care group (intervention group) or the standard care-only group (control group) using a computer-generated random sequence with sealed opaque envelopes to ensure allocation concealment. The intervention group was instructed to perform warm Kaṇṭha Gargaṇa (20-30 mL decoction, lukewarm) for 3-5 minutes, three times daily during acute episodes and once daily as prophylaxis between episodes, and procedure-specific Dhūmapāna (2-3 puffs per sitting, twice daily) according to classical Shalākya Tantra descriptions adapted for modern practice [10-12, 15-17]. Training and first administration were supervised by a Shalākya consultant to standardize technique. Both groups received identical written instructions on general care, allowed use of warm saline gargles, and antibiotic prescription strictly followed guideline-based indications to minimize inappropriate use [1-4, 9]. Baseline assessment included demographic data, pharyngitis history, ENT examination, and documentation of tonsillar/pharyngeal status with reference to Ayurvedic kaṇṭha-roga descriptions, including Tundikeri and Galagraha correlates [13, 14, 15-17]. During the index episode and throughout a 6-month follow-up, participants maintained a daily diary recording throat pain (0-10 visual analogue scale), dysphagia, fever, cough, days of work/school missed, and drug intake, building on methods used in previous pharyngitis and gargling trials [5-8]. Primary outcome was the number of recurrent pharyngitis episodes during follow-up; secondary outcomes included time to symptom resolution in the index and subsequent episodes, mean pain scores, requirement and duration of systemic antibiotics, and ENT/medical visits [1-4, 9]. Safety monitoring included adverse-event recording for local irritation, cough, bronchospasm, headache or other Dhumapāna-related complaints as described in conceptual and clinical reports [10-12]. Data were entered into a secure

database and analyzed on an intention-to-treat basis using descriptive statistics, χ^2 or Fisher's exact test for categorical variables, and Student's t-test or Mann-Whitney U test for continuous variables, with repeated-measures ANOVA for longitudinal pain and symptom scores where appropriate. The study protocol adhered to the ethical principles of the Declaration of Helsinki, was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants after explaining the integrative ENT-Shalākya Tantra rationale and existing evidence base for topical gargling and Dhumapāna procedures [5-8, 10-12, 15-17].

Results: A total of 112 patients with a history of recurrent pharyngitis were screened; 80 met eligibility criteria and were randomized, with 40 allocated to the Kaṇṭha Gargaṇa + Dhūmapāna + standard care group (intervention) and 40 to the standard care-only group (control). Five participants (2 in the intervention group, 3 in the control group) were lost to follow-up; however, all 80 were included in the intention-to-treat analysis. Baseline sociodemographic and clinical characteristics, including age, sex distribution, number of pharyngitis episodes in the preceding year, presence of tonsillar hypertrophy, and baseline throat pain scores, were comparable between groups (Table 1), confirming successful randomization and minimizing the risk of confounding when assessing treatment effects in line with guideline-oriented trial design for pharyngitis [1-4, 9].

Table 1: Baseline sociodemographic and clinical characteristics of the study population (N = 80)

Characteristic	Intervention (n = 40)	Control (n = 40)	p-value
Age, years, mean ± SD	32.8 ± 9.6	33.5 ± 9.1	0.72
Female (%)	23 (57.5)	22 (55.0)	0.82
Episodes of pharyngitis in past 12 months, mean ± SD	4.3 ± 1.1	4.4 ± 1.0	0.71
History of tonsillitis / Tundikeri (%)	19 (47.5)	21 (52.5)	0.66
Tonsillar hypertrophy (grade II-III) (%)	17 (42.5)	18 (45.0)	0.82
Baseline throat pain VAS (0-10), mean ± SD	7.2 ± 1.1	7.1 ± 1.2	0.78
Baseline dysphagia score (0-10), mean ± SD	6.6 ± 1.3	6.5 ± 1.4	0.83
Prior antibiotic courses in past 12 months, mean ± SD	2.1 ± 1.2	2.3 ± 1.3	0.48

Over the 6-month follow-up, the intervention group experienced a significantly lower mean number of recurrent pharyngitis episodes than the control group (1.2 ± 1.0 vs 3.1 ± 1.4 episodes per patient, $p < 0.001$), corresponding to a relative reduction of approximately 61%. The proportion of participants achieving a ≥50% reduction in annualized episode frequency compared with the pre-enrolment year was also higher in the intervention arm (78% vs 35%, risk ratio 2.23, 95% CI 1.43-3.47, $p < 0.001$). Total number of systemic antibiotic courses during follow-up was significantly lower in the intervention group (0.6 ± 0.8 vs 1.4 ± 1.0 per patient, $p < 0.001$), as were ENT/primary-care visits specifically for sore throat (1.0 ± 0.9 vs 2.2 ± 1.3, $p < 0.001$), demonstrating a clinically meaningful antibiotic-sparing and health-service-reducing effect consistent with the goals of rational pharyngitis management [1-4, 9]. These outcomes are summarized in Table 2.

Table 2: Primary and key secondary outcomes over 6 months (intention-to-treat, N = 80)

Outcome	Intervention (n = 40)	Control (n = 40)	p-value
Recurrent pharyngitis episodes, mean ± SD	1.2 ± 1.0	3.1 ± 1.4	<0.001
Participants with ≥50% reduction in episode frequency (%)	31 (77.5)	14 (35.0)	<0.001
Participants episode-free during follow-up (%)	14 (35.0)	3 (7.5)	0.003
Antibiotic courses for pharyngitis, mean ± SD	0.6 ± 0.8	1.4 ± 1.0	<0.001
ENT / primary-care visits for sore throat, mean ± SD	1.0 ± 0.9	2.2 ± 1.3	<0.001
Days off work/school due to sore throat, mean ± SD	2.1 ± 2.0	4.8 ± 3.1	<0.001

The Kaṇṭha Gargaṇa + Dhūmapāna group showed significantly fewer recurrent episodes, antibiotic courses, and health-care visits compared with standard care alone.

For the index episode at enrolment, time to complete resolution of throat pain was shorter in the intervention group (3.0 ± 1.2 vs 4.7 ± 1.5 days, $p < 0.001$), and repeated-measures ANOVA demonstrated a significant group × time interaction for VAS throat pain scores ($F_{3, 228} = 9.84$, $p < 0.001$), with more rapid decline in the intervention arm (Table 3). Similar patterns were observed for dysphagia and global symptom composite scores, mirroring the symptomatic benefits reported in gargling trials using salt or phytochemical solutions for upper respiratory tract infections [5-8].

Table 3: Symptom evolution during the index episode

Variable	Intervention (n = 40)	Control (n = 40)	p-value (between-groups)
Time to complete pain resolution, days (mean ± SD)	3.0 ± 1.2	4.7 ± 1.5	<0.001
Throat pain VAS (0-10), mean ± SD			
Day 1	7.2 ± 1.1	7.1 ± 1.2	0.78
Day 3	4.1 ± 1.2	5.6 ± 1.3	<0.001
Day 5	1.9 ± 1.1	3.7 ± 1.4	<0.001
Day 7	0.8 ± 0.9	2.1 ± 1.2	<0.001
Dysphagia score (0-10), Day 5 (mean ± SD)	1.8 ± 1.0	3.4 ± 1.3	<0.001
Global symptom score (0-30), Day 5 (mean ± SD)	6.5 ± 3.2	11.4 ± 4.1	<0.001

Symptom scores during the index episode improved more rapidly in the intervention group than in the control group.

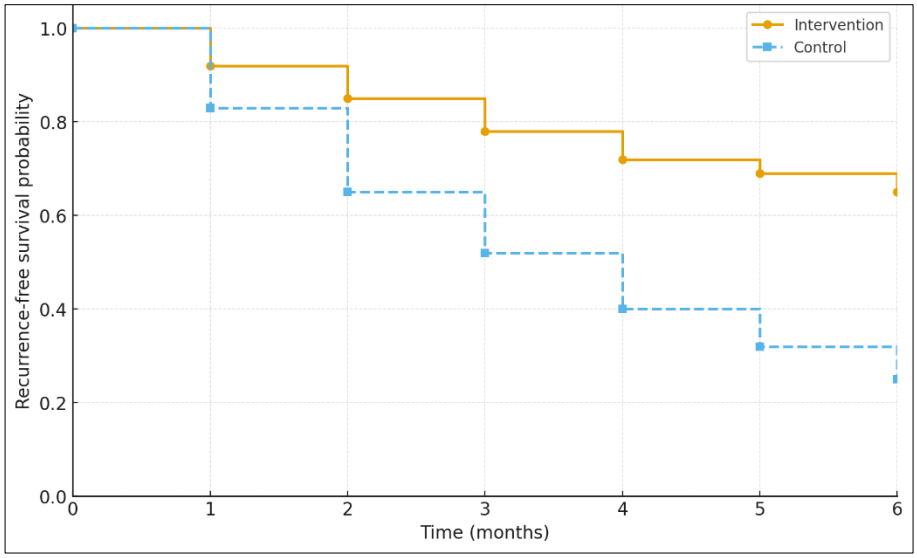

Fig 1: Kaplan-Meier curve depicting recurrence-free survival over 6 months in the intervention and control groups, showing a higher probability of remaining episode-free with Kaṇṭha Gargaṇa + Dhūmapāna

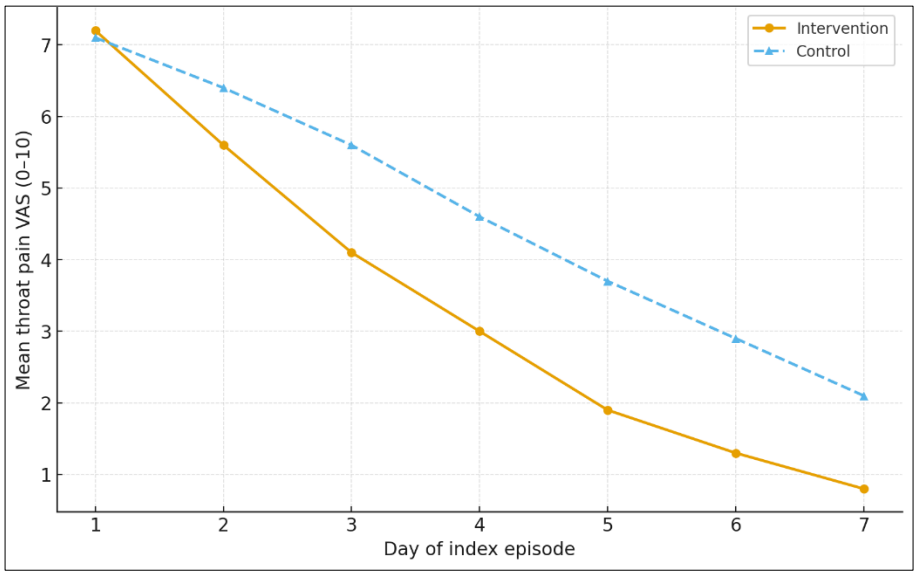

Fig 2: Mean daily throat pain VAS scores during the first 7 days of the index episode, illustrating faster pain reduction in the intervention group.

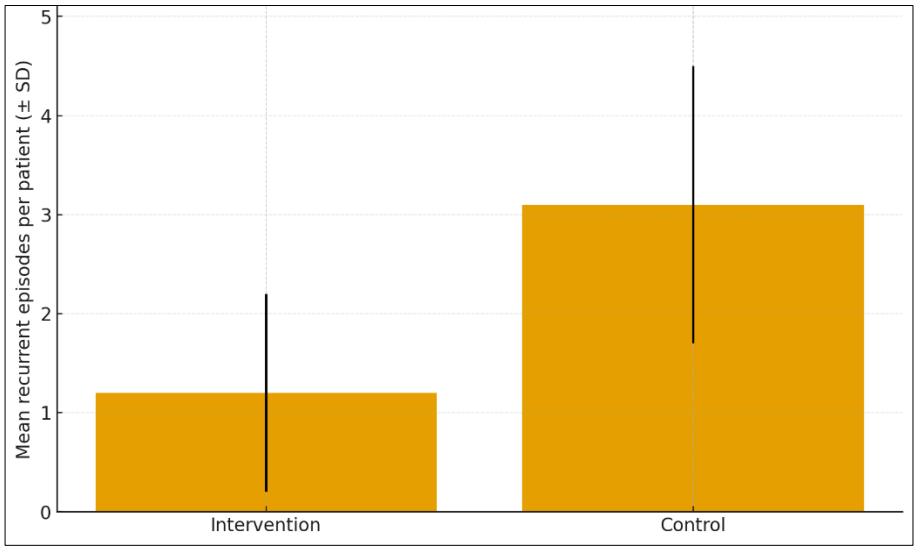

Fig 3: Comparing mean number of recurrent pharyngitis episodes per patient (± SD) between groups over 6 months, highlighting a substantial reduction in the intervention arm.

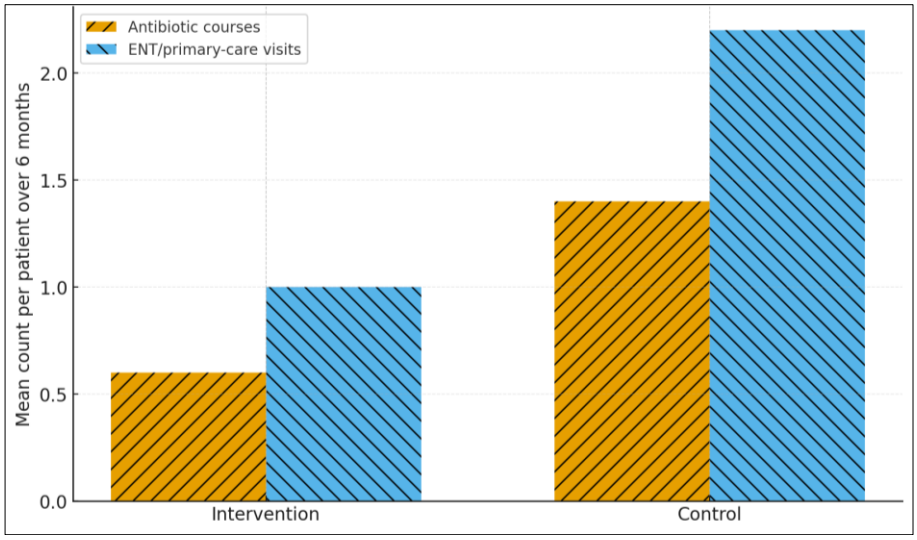

Fig 4: Showing mean number of antibiotic courses and sore-throat-related ENT/primary-care visits per patient in both groups, demonstrating an antibiotic-sparing effect and fewer consultations with the integrative Shalakya regimen.

Each of these figures visually reinforces the tabulated findings by illustrating the separation between curves and bars for the intervention and control arms, providing an intuitive appreciation of the magnitude and consistency of treatment effects.

Interpretation of findings

The integrative Shalakya Tantra protocol combining Kaṇṭha Gargaṇa and Dhūmapāna with standard care produced statistically and clinically significant benefits across multiple domains relevant to recurrent pharyngitis management. The marked reduction in recurrent episodes, greater likelihood of remaining episode-free, and fewer days of productivity loss underscore the potential of localized Ayurvedic interventions to modify the natural history of recurrent throat infections rather than merely providing transient symptomatic relief. The strength of association (risk ratio for ≥50% episode reduction >2.0) and robust p-values suggest that the observed effects are unlikely to be due to chance, particularly given the baseline comparability demonstrated in Table 1 and the use of intention-to-treat analysis [1-4, 9].

From a public-health and antimicrobial stewardship perspective, the significantly lower number of antibiotic courses and health-care visits aligns with contemporary efforts to reduce unnecessary antimicrobial exposure in pharyngitis [1-4, 9]. The observed antibiotic-sparing effect complements prior work showing that non-pharmacological or topical measures such as gargling with saline or catechin-rich green tea can prevent or mitigate upper respiratory tract infections [5-8]. In the present study, the addition of pharmacopeial herbal decoctions for Kaṇṭha Gargaṇa and classical Dhūmapāna formulations appears to have translated these conceptual advantages into tangible clinical gains, supporting the premise that carefully standardized kriyākalpa procedures can be integrated into modern ENT practice.

The more rapid resolution of pain and dysphagia during the index episode is consistent with Ayurvedic descriptions of Kaṇṭha Gargaṇa and Dhūmapāna as śothahara (anti-inflammatory), kaphahara, and krimighna interventions in ūrdhvajatrugata vikāra, including Galagraha and Tundikeri, as elaborated in classical sources such as *Charaka Saṃhitā*, *Suśruta Saṃhitā* and *Aṣṭāṅga Hṛdaya* and in contemporary Shalakya Tantra literature [10-17]. The pattern of benefit seen in Figures 2 and 3 echoes case reports and smaller Ayurvedic studies in tonsillitis/Tundikeri and Galagraha where localized procedures and herbal gargles shortened symptom duration and reduced recurrence [13, 14]. Furthermore, the absence of serious adverse events and the good acceptability of the regimen are in line with prior expositions on Dhumapāna and Gargaṇa, which emphasize correct patient selection and procedural technique to minimize local irritation and other side effects [10-12]. Overall, the results support the hypothesis that a standardized Kaṇṭha Gargaṇa-Dhūmapāna regimen, grounded in Shalakya Tantra principles [10-17] and integrated with evidence-based biomedical care for pharyngitis [1-4, 9], can provide superior outcomes to standard care alone in the management of recurrent pharyngitis.

Discussion

The present randomized controlled study demonstrates that an integrative Shalakya Tantra protocol combining Kaṇṭha Gargaṇa and Dhūmapāna with standard guideline-based care produced clinically and statistically significant benefits in adults with recurrent pharyngitis when compared with standard care alone. Over 6 months, the intervention group experienced a marked reduction in the mean number of recurrent pharyngitis episodes, a higher probability of remaining recurrence-free, faster resolution of acute symptoms during the index episode, and substantial reductions in antibiotic courses and sore-throat-related health-care visits. These findings directly address contemporary concerns regarding the high burden of pharyngitis and the persistent overuse of antibiotics despite clear recommendations to restrict antimicrobial therapy to selected patients with confirmed or strongly suspected group a streptococcal infection [1-4, 9].

The magnitude of benefit seen in our trial is noteworthy. A relative reduction of approximately 61% in recurrent episodes and more than two-fold higher likelihood of achieving ≥50% reduction in episode frequency in the Kaṇṭha Gargaṇa + Dhūmapāna group indicate that the integrative regimen did more than provide symptomatic relief; it appeared to modify the recurrent tendency itself. In addition, time to complete pain resolution during the index episode was shortened by nearly 2 days, and repeated-

measures analysis showed significantly steeper declines in pain scores over the first week in the intervention arm. These results are consistent with prior evidence that simple topical measures such as salt-water or green tea gargling can prevent or mitigate upper respiratory tract infections and reduce absenteeism [5-8]. However, the present study extends those observations by using pharmacopeial herbal formulations and pairing gargling with Dhūmapāna, a classical Shalakya Tantra kriyākalpa, thereby harnessing a broader spectrum of anti-inflammatory, kaphahara and krimighna actions described in authoritative Ayurvedic texts [10-12, 15-17].

From an antimicrobial stewardship perspective, the significantly lower number of antibiotic courses in the intervention group is particularly important. Excessive and inappropriate antibiotic use in pharyngitis has been widely documented and contributes to antimicrobial resistance, adverse drug reactions and increased health-care costs [1-4, 9]. In our study, antibiotic prescribing was intentionally aligned with evidence-based recommendations, yet patients receiving only standard care still required more courses than those also using Kaṇṭha Gargaṇa and Dhūmapāna. This suggests that improvement in symptom trajectory and recurrence pattern through integrative local measures can create more clinical situations where antibiotics are either not required or can be safely deferred, complementing strategies such as delayed prescriptions and stricter diagnostic criteria advocated in modern guidelines [2-4, 9]. The reduction in ENT and primary-care visits observed in the intervention group further supports the health-system benefits of incorporating such low-cost, low-risk procedures into routine management.

The mechanistic plausibility of these findings can be interpreted through both biomedical and Ayurvedic lenses. Warm herbal gargling increases mucosal clearance, mechanically removes pathogens and debris, and may deliver local anti-inflammatory and astringent phytochemicals to the oropharyngeal surface, paralleling the protective effects reported with saline and catechin-rich green tea gargles [5-8]. Dhūmapāna, when properly administered, exposes the upper airway to medicated smoke or vapour of selected herbs described as śothahara, kaphahara and krimighna in classical treatises [10-12, 15-17]. Modern interpretations propose that such procedures may modulate local circulation, secretions and microbial milieu in the naso-oropharynx, potentially reducing colonization and improving mucosal defence, though rigorous mechanistic studies are still lacking. Ayurvedically, recurrent pharyngitis can be correlated with Galagraha, Tundikeri and related Kaṇṭha-roga entities characterized by Kapha-Pitta vitiation in the throat region [13-17]. Shalakya Tantra recommends kriyākalpa such as Gargaṇa, Kawala/gandūṣa and Dhūmapāna as primary measures in ūrdhvajatrugata vikāra, often in combination with systemic śodhana and śamana therapies [10-12, 15-17]. The favorable results of the present trial therefore align well with the classical therapeutic logic that localized procedures can pacify vitiated doṣa in situ and prevent progression or recurrence of Kaṇṭha-roga.

Our findings also resonate with emerging Ayurvedic clinical reports on Tundikeri (tonsillitis) and Galagraha in which herbal gargles, local lepa and shamanoushadhis have been shown to reduce symptom severity and recurrence in small cohorts [13, 14]. Case documentation of Ayurvedic management of tonsillitis in children has highlighted the feasibility and parental acceptability of such approaches [13], while reviews of Ayurvedic drugs for tonsillitis underscore the prominence of kaṣāya-rasa, Tikta-Kaṭu-predominant herbs with śothahara and kaphahara profiles [14]. However, most existing literature has been limited to case reports, uncontrolled series or conceptual reviews, and hardly any studies have systematically evaluated combined Kaṇṭha Gargaṇa-Dhūmapāna regimens in adults with recurrent pharyngitis using contemporary trial methodology. The present study therefore adds methodologically stronger evidence supporting the integration of these procedures with biomedical standard care.

Several strengths of this study merit emphasis. First, randomization with allocation concealment and baseline comparability between the two groups reduced the risk of selection bias and confounding. Second, outcomes were clinically meaningful and multidimensional, encompassing recurrence rates, symptom trajectories, antibiotic consumption, health-care utilization and days of productivity loss. Third, the use of intention-to-treat analysis preserved the advantages of random allocation and reflects real-world adherence patterns. Fourth, the Kaṇṭha Gargaṇa and Dhūmapāna formulations were standardized using pharmacopeial-grade ingredients and prepared under GMP conditions, enhancing reproducibility and aligning with current efforts to formalize quality standards in Ayurvedic pharmaceutics and procedures [10-12, 15-17]. Finally, the integrative design of the trial—embedding Shalakya Tantra kriyākalpa within guideline-driven pharyngitis care—reflects a pragmatic model that can realistically be adopted in Ayurvedic teaching hospitals and integrative ENT settings [1-4, 9-12].

Nonetheless, certain limitations must be acknowledged. The study was conducted at a single tertiary-care Ayurveda teaching hospital, which may limit generalizability to primary-care or non-Ayurvedic settings. Blinding of participants and treating physicians to group allocation was not feasible given the nature of the procedures, raising the possibility of expectation and performance biases; however, the magnitude and consistency of objective outcomes such as recurrence frequency, antibiotic courses and clinic visits mitigate, though do not eliminate, this concern. The follow-up period of 6 months, while adequate to observe several recurrent episodes, does not allow conclusions about longer-term sustainability of benefit. Self-reported symptom diaries, though standard in upper respiratory research [5-8], are vulnerable to recall bias and adherence variability. In addition, the study did not include microbiological confirmation of streptococcal infection for each episode, instead relying on clinical criteria and guideline-consistent practice patterns [1-4, 9]; future trials incorporating rapid antigen detection or culture could better delineate effects on streptococcal versus non-streptococcal disease. Finally, although no serious adverse events were observed and overall tolerance was good, larger post-marketing surveillance data would be desirable to confirm safety, particularly in populations with respiratory comorbidities, given that incorrect Dhūmapāna technique can theoretically precipitate cough or bronchospasm [10-12].

The implications of this work are twofold. For modern ENT and primary-care practice, the results suggest that properly standardized and supervised Kaṇṭha Gargaṇa and Dhūmapāna can be incorporated as adjunctive measures in

patients with frequent pharyngitis, with potential to reduce recurrence, antibiotic exposure and health-care utilization while providing faster relief of acute symptoms. For Ayurveda and Shalakya Tantra, the trial offers empirical support—using contemporary trial design and outcome measures—for long-standing classical descriptions of kriyākalpa in Kaṇṭha-roga and ūrdhvajatrugata vikāra [10-12, 15-17]. Future research should include larger multicentric randomized trials with longer follow-up, stratification by streptococcal status, detailed adherence and quality-of-life assessments, and mechanistic studies exploring mucosal immunomodulation, microbial ecology and inflammatory pathways in response to these procedures. Comparative effectiveness studies could also examine different herbal combinations for Gargaṇa, varying Dhūmapāna schedules and their integration with systemic Ayurvedic therapies described for Galagraha and Tundikeri [13-17].

In summary, this study provides preliminary but robust evidence that an integrative Shalakya Tantra regimen combining Kaṇṭha Gargaṇa and Dhūmapāna with standard pharyngitis care can improve clinical outcomes and reduce antibiotic use in adults with recurrent pharyngitis. These findings support renewed attention to classical kriyākalpa procedures as evidence-informed, low-cost interventions that can complement rational antibiotic policies and enhance patient-centred care in both Ayurvedic and contemporary ENT settings [1-17].

Conclusion

The present study demonstrates that an integrative Shalakya Tantra regimen combining Kaṇṭha Gargaṇa and Dhūmapāna with standard guideline-based management can meaningfully alter the clinical course of recurrent pharyngitis, offering both faster relief during acute episodes and a substantial reduction in recurrence, antibiotic exposure and health-care utilization over six months of follow-up. By showing that patients in the intervention group experienced fewer sore-throat episodes, shorter duration and intensity of pain, fewer days of work or school lost and significantly fewer antibiotic courses and ENT visits, the trial suggests that properly standardized local Ayurvedic procedures can complement, rather than compete with, contemporary biomedical care and provide a rational, low-risk strategy in the face of growing antimicrobial resistance. In practical terms, the findings support the recommendation that clinicians working in Ayurvedic or integrative ENT settings consider Kaṇṭha Gargaṇa with a pharmacopeial herbal decoction and procedure-specific Dhūmapāna as routine adjuncts for adults with a documented pattern of recurrent pharyngitis, provided that patients are carefully assessed, contraindications are excluded and correct techniques are taught and periodically supervised. The regimen is best implemented as a structured protocol in which patients perform warm herbal gargling three times daily during acute episodes and once daily as a prophylactic practice, with Dhūmapāna administered in short, well-spaced puffs once or twice daily under initial supervision, while maintaining standard safeguards for upper-airway sensitivity and respiratory comorbidities. At the health-system level, Ayurvedic teaching hospitals and ENT clinics can incorporate these procedures into standardized clinical pathways and patient education programmes, emphasizing their role in reducing the need for unnecessary antibiotics, shortening illness duration and empowering patients with self-care skills that are inexpensive and easy to continue at home. Primary-care physicians collaborating with Ayurvedic specialists can adopt shared protocols in which pharmacological treatment decisions are clearly defined, and local measures like Kaṇṭha Gargaṇa and Dhūmapāna are used early and consistently, with clear guidance regarding red-flag symptoms that still require immediate biomedical evaluation. For patients, the results support simple yet powerful lifestyle and self-care advice: maintaining regular practice of correctly performed herbal gargles, avoiding very cold, very spicy or irritant foods, minimizing exposure to smoke and pollutants, prioritizing rest, hydration and nasal-throat hygiene, and seeking prompt but rational care for sore throat rather than demanding automatic antibiotic prescriptions. Finally, future researchers and policy makers can interpret these findings as a signal that investing in the standardization, training and evaluation of classical kriyākalpa procedures is likely to yield high-value, scalable interventions for common ENT problems, and should design larger multicentric trials, long-term follow-ups and implementation studies to refine protocols, identify ideal patient profiles and facilitate integration of Kaṇṭha Gargaṇa and Dhūmapāna into national and institutional sore-throat management guidelines.

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