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Hypertonic Seawater Spray Enriched with Algal and Herbal Ingredients in Patients with ENT Conditions: A Real-World User Survey

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Abstract

Ear, Nose, and Throat (ENT) conditions, including Upper Respiratory Tract Infections (URTIs) such as the common cold and seasonal influenza, are among the most common reasons for primary care visits and a major cause of short-term functional impairment and increased medication use. Hypertonic saline nasal irrigation is an established non-pharmacological intervention for sinonasal symptom relief. This prospective, real-world user survey study evaluated the clinical performance, safety, and user acceptability of a 2.3% NaCl hypertonic seawater nasal spray enriched with algal and herbal ingredients in 85 patients with ENT conditions, predominantly common cold and influenza. Patients completed a structured questionnaire assessing sinonasal and quality-of-life (QoL) symptom severity before and after product use, along with parameters of overall satisfaction, ease of use, efficacy, and safety. Nasal congestion decreased by 62.9%, runny nose by 65.6%, itchy nose by 73.1%, while 47% of patients reported noticeable symptom relief within 5 minutes of first application. The overall satisfaction score reported by patients was 4.93/6, while the perceived efficacy score was 5.00/6. The safety profile observed in this study was favorable, with adverse events being predominantly mild and self-limiting; no device malfunctions were reported. Overall, these findings suggest that this hypertonic seawater nasal spray is a safe, well-tolerated, and effective non-pharmacological option for the management of sinonasal symptoms in patients with the common cold, influenza, and related ENT conditions in routine clinical practice.

Keywords: Nasal spray; Hypertonic saline; Nasal irrigation; ENT; Common cold; Seawater; Undaria pinnatifida; Spirulina platensis; herbal ingredients; Real-world study; User survey

Abbreviations: AE: Adverse Event; ENT: Ear, Nose, and Throat; SD: Standard Deviation; URTI: Upper Respiratory Tract Infection; QoL: Quality of Life

Introduction

Ear, Nose, and Throat (ENT) conditions are among the most frequent reasons for primary care consultations in both adults and children. The most common of these are Upper Respiratory Tract Infections (URTIs), particularly the common cold and seasonal influenza [1], while related conditions such as rhinosinusitis and allergic rhinitis contribute broadly to the overall burden of sinonasal symptoms encountered in everyday practice [1]. Their management remains largely symptomatic, while commonly used pharmacological treatments, including systemic decongestants, antihistamines, and non-steroidal anti-inflammatory drugs, are often associated with tolerability concerns and the potential for overuse. Therefore, there is increasing interest in non-pharmacological interventions that can safely alleviate nasal symptoms, and reduce unnecessary exposure to pharmacological treatments.

Nasal irrigation and spray therapies using isotonic or hypertonic saline solutions are well-established interventions in the management of ENT conditions. The European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020) endorses saline nasal irrigation as a recommended adjunctive treatment, supported by evidence demonstrating improved mucociliary clearance, reduction of nasal mucosal edema, and mechanical removal of viral particles, allergens, and inflammatory mediators [2]. Among saline formulations, hypertonic solutions (>0.9% NaCl) have demonstrated superior symptom relief compared to isotonic alternatives, due to their osmotic decongestant effect i.e., osmotically driven reduction of mucosal edema, increased ciliary beat frequency, and enhanced secretion clearance [3-7]. In addition, in pediatric populations, hypertonic saline nasal irrigation has demonstrated significant reductions in rhinoconjunctivitis symptoms and antihistamine use in children with seasonal allergic rhinitis [8,9].

The present study was designed as a prospective, real-world

user survey to evaluate the clinical performance, safety, and user acceptability of a hypertonic seawater nasal spray enriched with algal and herbal ingredients in patients presenting with ENT conditions, predominantly the common cold and influenza, under routine conditions of use. Real-world evidence generated through such surveys complements data from controlled clinical studies and may contribute to a broader understanding of product performance and support its ongoing clinical evaluation.

Methods

Medical device:

The product evaluated in this study was Sinomarin® 2.3% Plus Algae Cold & Flu Relief, 30 mL spray; Gerolymatos International S.A (hereafter referred to as HSS). This nasal spray is composed of hypertonic (2.3% NaCl) seawater solution enriched with two algal extracts (Undaria pinnatifida and Spirulina platensis) and three herbal components (essential oils from Eucalyptus globulus and Mentha spicata, and Thymus vulgaris extract). The herbal components are commonly incorporated into nasal spray formulations to provide a pleasant aromatic sensation during use [10]. The algal extracts are rich in naturally occurring hydrophilic polysaccharides with water-binding properties, thereby supporting hydration and moisturization of the nasal mucosa [11–13]. HSS is indicated for use in adults and children for nasal irrigation, for relieving symptoms of the common cold & flu including nasal congestion, sinus pressure and runny nose, cleansing the nasal cavities and moisturizing the nasal mucosa.

Survey patients and design:

This real-world, prospective user survey was conducted in Cyprus between November 2025 – May 2026, and enrolled 85 participants. Eligible participants were adult and pediatric patients (aged ≥6 years) presenting with symptoms of common cold, influenza, rhinosinusitis, sinusitis, or allergic rhinitis, in whom HSS was being used or had been recommended as part of routine clinical management.

Upon enrolment, patients were instructed to use HSS according to the product's label. Each patient completed a structured questionnaire at two time points: before the first use of the nasal spray, and after a period of use (typically 7–14 days). The questionnaire collected demographic information (age and sex), the condition for which HSS was used, pre- and post-treatment sinonasal symptom severity and Quality-of-Life (QoL) scores, information on usage patterns (frequency and timing relative to concomitant medication), as well as overall satisfaction, perceived efficacy, ease of use, safety, and product performance.

Questionnaire and Outcome Measures:

Sinonasal symptoms severity (stuffy nose, runny nose, sneezing, itchy nose, and other nasal problems) and QoL symptoms (fatigue, reduced productivity, poor sleep, emotional tiredness, and overall feeling) were assessed using a Likert scale ranging from 0 (not troubled) to 6 (extremely troubled), consistent with previously published user survey methodologies [14-16]. Overall satisfaction and overall efficacy ratings were captured using structured response options (extremely satisfied (6) to extremely dissatisfied (1)). Ease of use was assessed with a six-point scale from "Absolutely Yes (1)" to "Absolutely Not (6)."

Data analysis:

A total of 85 completed questionnaires were included in the final analysis. Responses were entered into a predefined database and exported for statistical analysis. Before analysis, the dataset was checked for completeness and internal consistency. The questionnaire included paired categorical items assessing responses before and after product use, as well as secondary outcomes including overall satisfaction, ease of use, perceived effectiveness, and related user-reported measures. For paired before–after categorical analyses, only participants with valid responses for both corresponding items were included in the analysis. Participants with a missing response for either item of the pair were excluded only from that specific paired comparison.

For secondary outcomes, analyses were performed using all participants with a valid response for the relevant item, and the corresponding denominator was reported where applicable. Inconsistent responses were managed according to predefined rules. No participants were excluded on the basis of response inconsistency.

Statistical analysis:

Data were analyzed using Python (version 3) in Jupyter Notebook (version 7.0.8) within the Anaconda distribution, together with standard statistical packages including NumPy and SciPy. Study variables were described as categorical variables using absolute and relative frequencies before and after treatment. For each item, changes after treatment were classified as improvement, no change, or worsening and summarized in frequency tables. Average scores were calculated for each item based on the respective rating scales: 0–6 (Not troubled – Extremely troubled), 1–6 (Absolutely yes – Absolutely not), or 1-6 (Extremely dissatisfied –Extremely satisfied), with percentages based on the total number of patients/responses. Percentage improvement was calculated as: (mean score before − mean score after) / mean score before × 100. Continuous variables are presented as mean (standard deviation) and median (interquartile range). Comparisons between variables were performed using Wilcoxon signed-rank test or paired t-test, as appropriate, with a significance level set at $\alpha = 0.05$.

Results

Survey population and product use:

A total of 85 patients were enrolled in this study; paired analyses were performed using all available pre- and post-treatment responses for each outcome. The mean age was 37.7 ± 13.3 years (median 38 years; age recorded for 77 of the 85 patients). Of the 85 patients, 54 were female (63.5%) and 31 were male (36.5%) **(Figure 1A)**. Five pediatric patients (aged <18 years) were included. The most common diagnosis was common cold & flu (78.8%, n=67). Rhinosinusitis was reported in 8.2% (n=7), sinusitis in 7.1% (n=6), and allergic rhinitis in 4.7% (n=4) of patients; one patient (1.2%) did not report the condition **(Figure 1B)**.

Among the patients who reported treatment duration (n=78), the mean duration of product use was 6.2 ± 3.7 days (median: 5 days; range: 2–30 days). Most patients (67.9%) used the product for 4–7 days **(Figure 2A)**. Nearly half of the patients (47.1%) used the Hypertonic Seawater Spray (HSS) 1–3 times daily, whereas 41.2% used it more than three times daily **(Figure 2B)**.

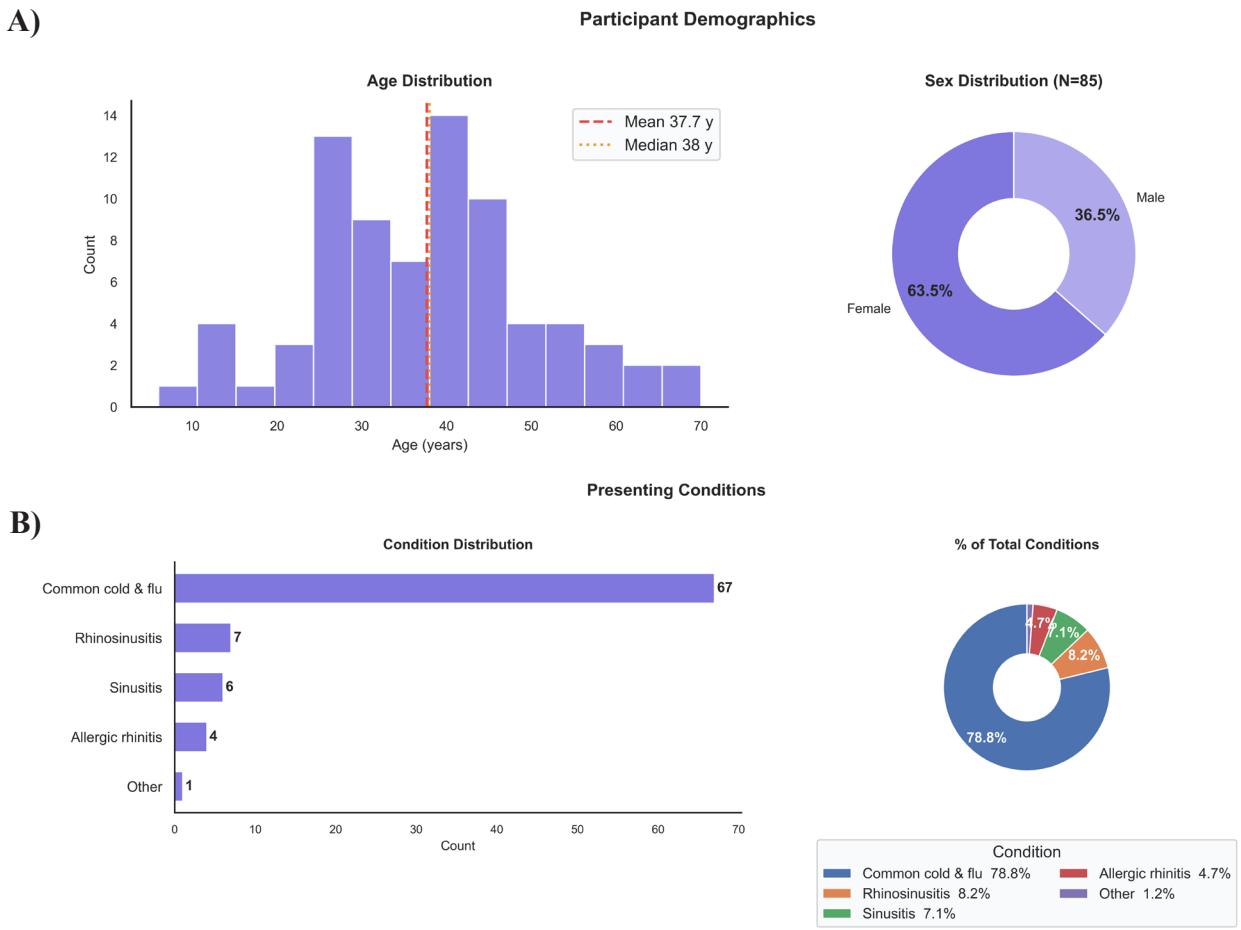

Figure 1: Demographic characteristics and presenting disease conditions of the study population. (A) Age distribution histogram (n=77 with age recorded; mean 37.7 years, median 38 years) and sex distribution (n=85). (B) Distribution of presenting diagnoses by patient count and as a percentage of total conditions (n=85).

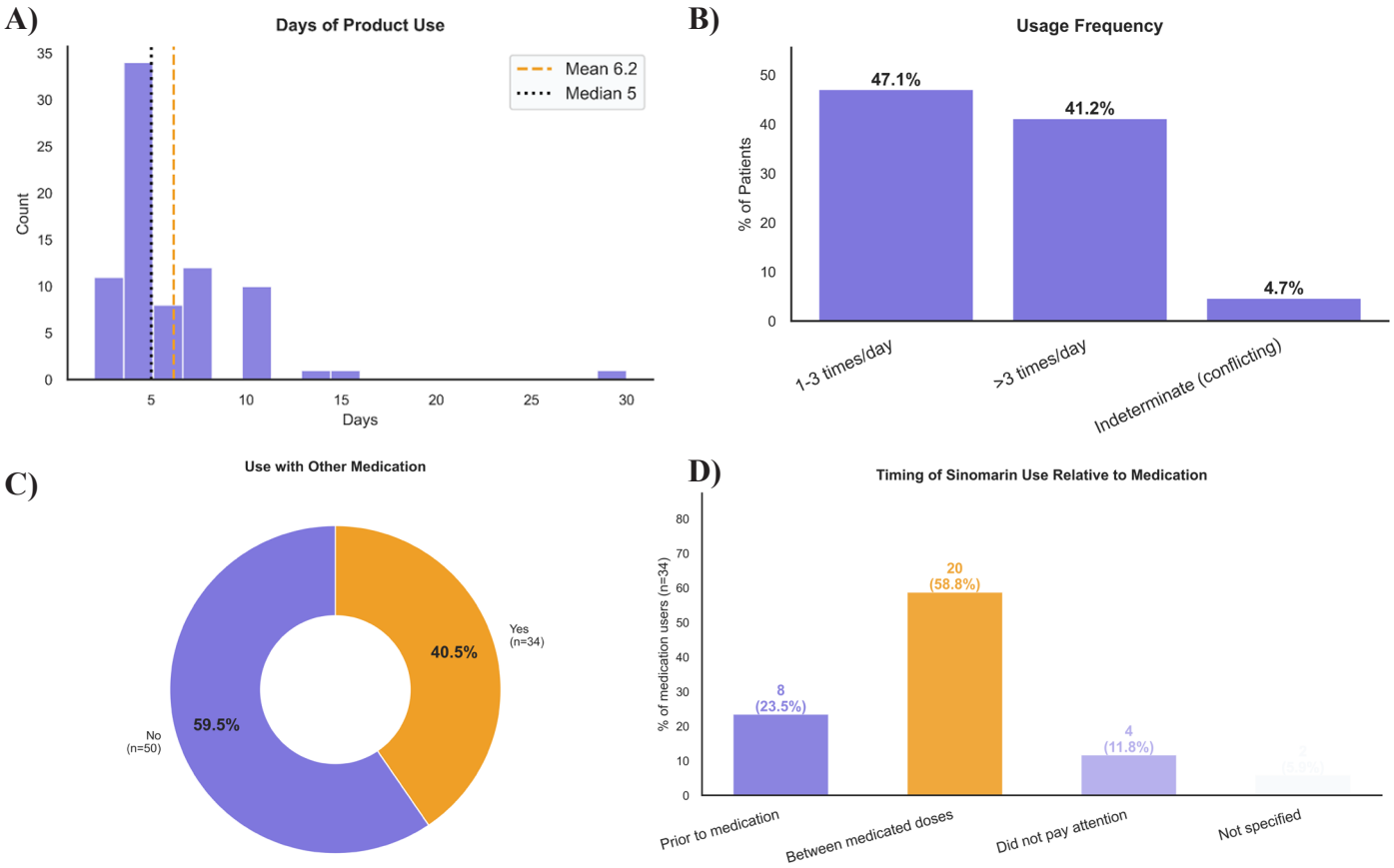

Figure 2: Treatment usage patterns. (A) Distribution of days of product use (n=78; mean 6.2 days, median 5 days). (B) Usage frequency: number of patients using HSS 1–3 times/day versus >3 times/day. Two patients selected both response options; therefore, these responses were treated as conflicting/indeterminate, one patient reported "3-4 times/day", and one "every day" (indeterminate). (C) Proportion of patients who used HSS concomitantly with other medications (n=34). (D) Timing of HSS administration relative to concomitant medication doses among medication users (n=34).

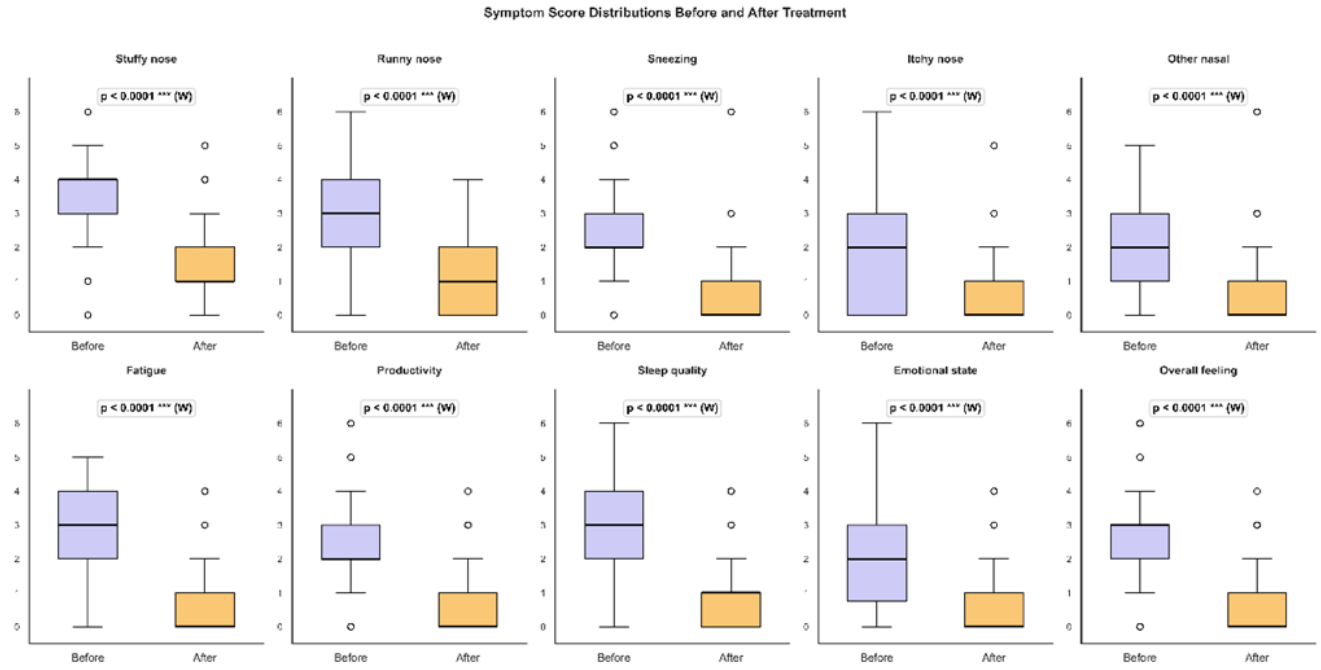

Figure 3: Symptom score distributions before and after treatment. Box plots depicting the distribution of patient-reported symptom severity scores (scale 0–6) for all ten evaluated domains, five sinonasal (stuffy nose, runny nose, sneezing, itchy nose, other nasal) and five quality-of-life (fatigue, productivity, sleep quality, emotional state, overall feeling), before (purple) and after (orange) HSS use. All pairwise comparisons were statistically significant (Wilcoxon signed-rank test, p < 0.0001). Circles indicate outliers (included in the analysis). Note that sample size varied slightly between items because only paired responses were included.

40.5% (n=34) of patients used HSS concomitantly with other medications, most frequently analgesic and antipyretic agents (**Figure 2C**; data not shown). Among these patients, HSS was most commonly administered between doses of concomitant medication (58.8%), whereas 23.5% reported using HSS prior to medication intake **(Figure 2D)**.

Sinonasal and Quality-of-Life Symptom Improvement:
The use of HSS resulted in significant improvements across all evaluated outcomes, indicating a consistent reduction in symptom severity and improvement in patient-reported well-being. Among sinonasal symptoms, stuffy nose showed an improvement of 62.9% (pre-treatment: 3.64 ± 1.2; post-treatment: 1.35 ± 1.03, n=80). Of note, nasal congestion was the most severely rated symptom at baseline. Similar improvements were observed for runny nose (65.6%; pre: 3.08 ± 1.45, post: 1.06 ± 1.02, n=84), sneezing (73.9%; pre: 2.48 ± 1.39, post: 0.65 ± 1.0, n=85), itchy nose (73.1%; pre: 1.84 ± 1.50, post: 0.49 ± 0.88, n=85), and other nasal symptoms, including watery eyes, sore throat, and reduced taste or smell (75.3%; pre: 2.17 ± 1.54, post: 0.54 ± 0.97, n=82) (**Figure 3**, upper panel).

In addition, HSS use was also associated with significant improvements across all assessed quality-of-life parameters. The greatest relative improvement was observed for reduced productivity (74.8%; pre: 2.43 ± 1.30, post: 0.61 ± 0.88, n=83), followed by fatigue (73.9%; pre: 2.60 ± 1.30, post: 0.68 ± 0.91, n=84), overall feeling (73.6%; pre: 2.58 ± 1.28, post: 0.68 ± 0.92, n=78), emotional state (71.7%; pre: 1.89 ± 1.54, post: 0.54 ± 0.91, n=84), and sleep quality (71.5%; pre: 2.93 ± 1.26, post: 0.83 ± 0.98, n=84) (**Figure 3**, lower panel).

All changes were statistically significant ($p < 0.0001$), indicating a substantial positive impact of HSS on both symptom burden and daily functioning.

The onset of symptoms relief reported (n=85) was rapid following HSS use. Specifically, within 5 minutes, 47% of patients reported noticeable improvement; a further 42% within 30 minutes **(Figure 4A)**. Only 8% noted improvement after 30 minutes, and 2% reported no improvement. Considering the time to first perceived improvement (n=85), 49% of patients reported symptom relief by Day 1, increasing to 81% by Day 2. By Day 3, 92% had experienced improvement, reaching 98% by Day 5. Only one patient (1%) reported no improvement throughout the use period **(Figure 4B, 4C)**. To further explore whether HSS use frequency could influence symptom improvement, data were compared between patients using HSS 1–3 times/day (n = 40) and those using it >3 times/day (n = 35).

Overall, the higher-frequency group demonstrated numerically greater improvements across most sinonasal and quality-of-life parameters, particularly for sneezing (79% vs 70%) and itchy nose (81% vs 64%), where statistically significant between-group differences were observed (Figure 4D). Improvements in stuffy nose (66% vs 62%), runny nose (68% vs 63%), fatigue (74% vs 70%), sleep quality (71% vs 70%), emotional state (71% vs 70%), and overall feeling (74% vs 69%) were also recorded in the >3x/day group, but the differences were not statistically significant. In contrast, improvement in "other nasal symptoms" was greater in the 1–3x/day group (78% vs 72%), while productivity was comparable between groups (73% in both arms) **(Figure 4D)**. These data suggest a potential association between higher HSS usage frequency and greater improvement in selected sinonasal symptoms, although this pattern was not consistent across all parameters.

Considering medication use, patients were asked whether the use of HSS helped reduce overall medication intake. Among patients using HSS concomitantly with medication (n=34), 32.4% responded "Yes" and 41.2% "Maybe Yes" **(Figure 5A)**. Some patients not using concomitant medication also answered this question and reported a perceived reduction in medication use (21.6% "Yes", 13.7% "Absolutely yes", and

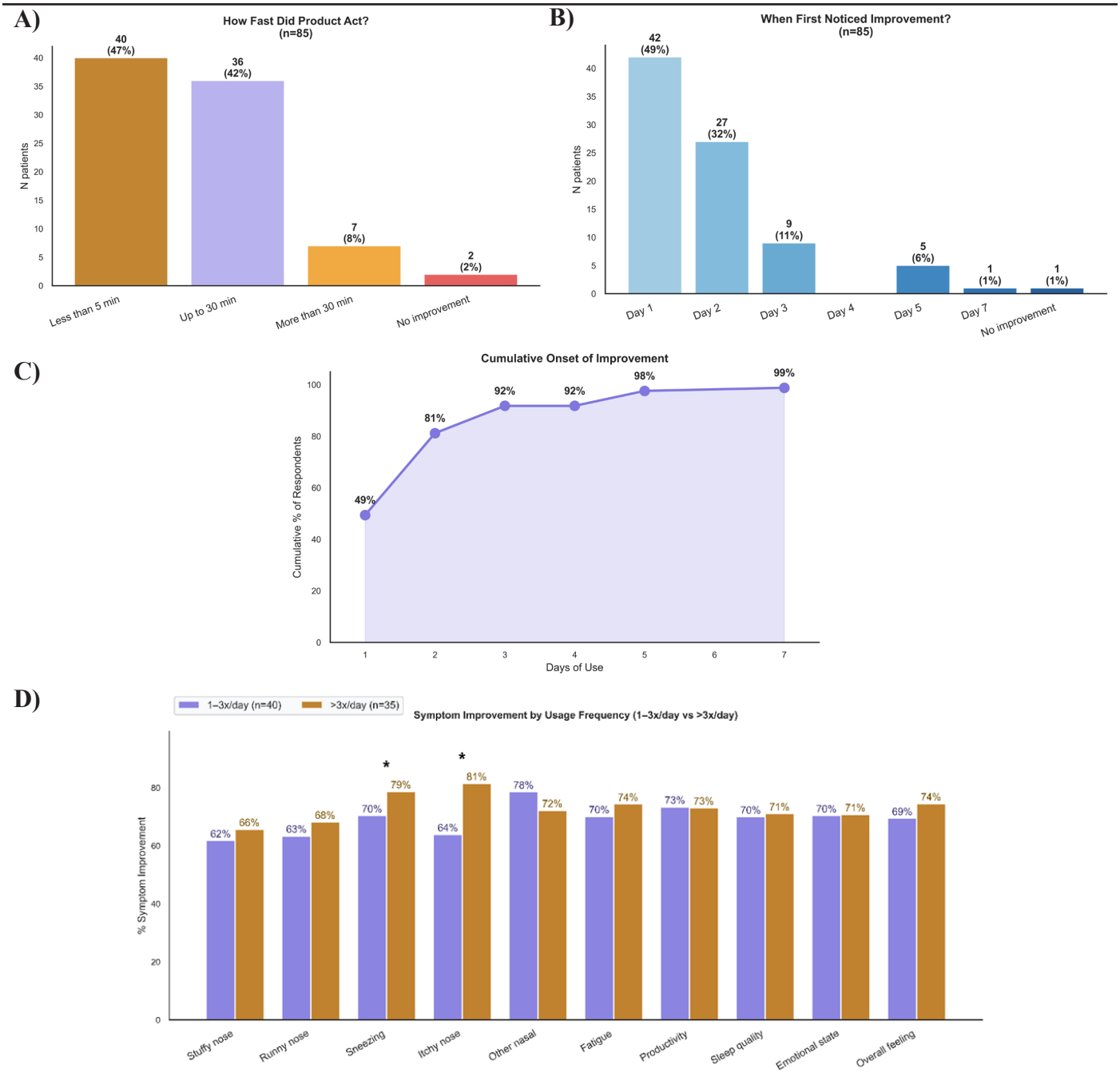

*Figure 4: Onset and kinetics of symptom improvement. (A) Patient-reported time to first perceptible improvement following HSS use (n=85). (B) Day of first noticed improvement (n=85). (C) Cumulative percentage of patients reporting symptom improvement by day of use. (D) Percentage symptom improvement across all ten domains stratified by usage frequency (1–3 times/day, n=40; >3 times/day, n=35). * $p < 0.05$.*

11.8% "Maybe Yes"); however, these responses may partly reflect their baseline medication use **(Figure 5A)**. In addition, regarding the willingness to use HSS without concomitant medication, data showed that patients generally expressed a positive tendency to do so **(Figure 5B)**. Among patients who had used HSS together with medication (n = 34), 64.7% provided a positive response for future use of HSS without medication, including 26.5% who responded "Maybe Yes" and 38.2% who responded "Yes" **(Figure 5B)**. Conversely, 35.3% expressed uncertainty or unwillingness to use HSS without medication, including 17.6% "Maybe Not," 14.7% "Not," and 2.9% "Absolutely Not." In the overall study population that answered the question (n = 72), including patients who used HSS concomitantly with medication (n=34) and without medication (n=38), 79.2% of patients indicated a positive willingness to use HSS without medication, including 20.8% "Maybe Yes," 43.1% "Yes," and 15.3% "Absolutely Yes" responses **(Figure 5B)**. Taken together, these findings suggest that HSS was perceived as a potential standalone option by a substantial proportion of patients.

Consumer Satisfaction and Ease of Use:

Patient-reported evaluation of HSS showed a favorable overall response across perceived efficacy, satisfaction, ease of use, and future use intention. Regarding overall efficacy (n=84), most respondents reported positive experiences, with 46% indicating that they were very satisfied and 31% extremely satisfied **(Figure 6A)**. An additional 17% reported being somewhat satisfied, while only a small proportion expressed dissatisfaction.

A similar pattern was observed for overall satisfaction (n=85). Among the respondents, 47% reported being very satisfied and 27% extremely satisfied, corresponding to a collective high-satisfaction rate of 74% **(Figure 6B)**. A further 20% of participants were somewhat satisfied, whereas dissatisfaction was reported by only 6% of respondents.

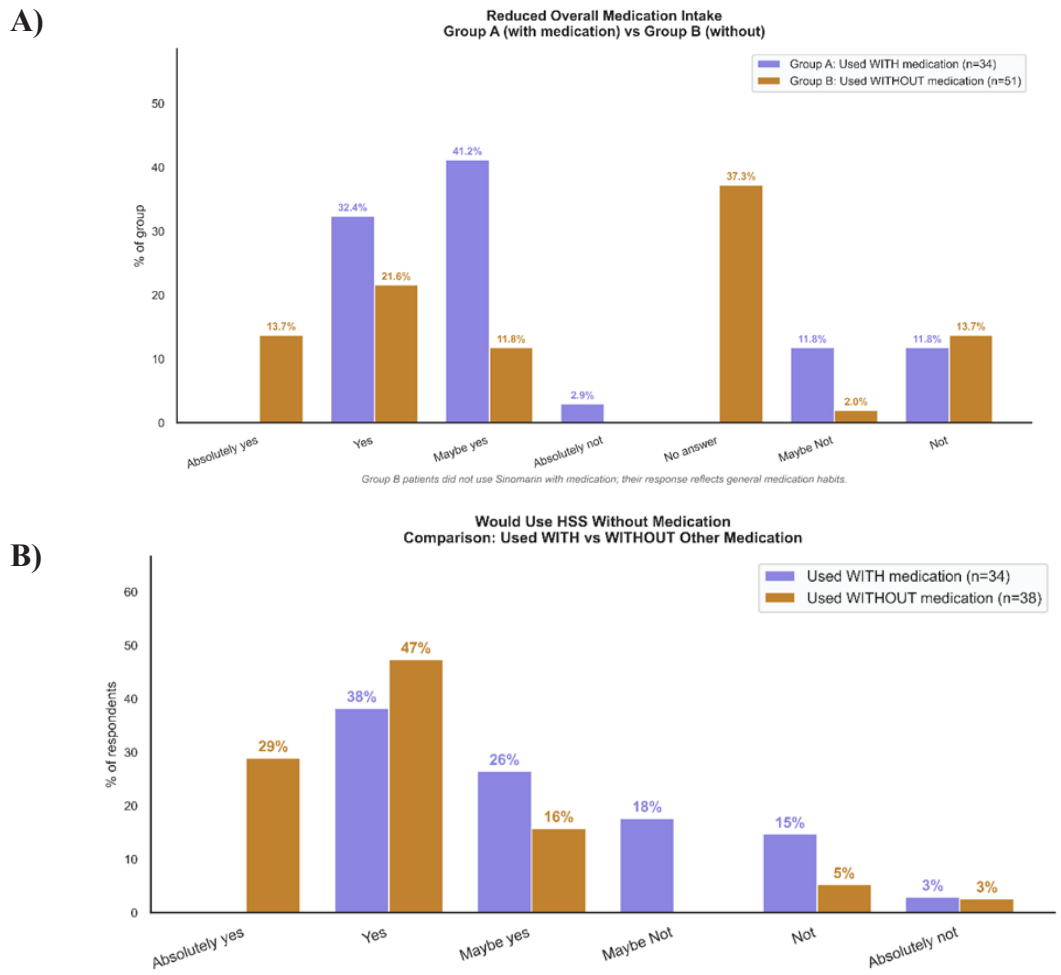

Figure 5: Reduced overall medication intake and willingness to use HSS without concomitant medication. Patient-reported (A) reduction in overall medication, and (B) willingness to use HSS without concomitant medication, among patients using medication at baseline (n=34) and those not using medication (n=38). In panel A, the no-concomitant-medication group includes all patients not receiving medication (n=51). In panel B, only patients providing a response to this question are shown (n=38).

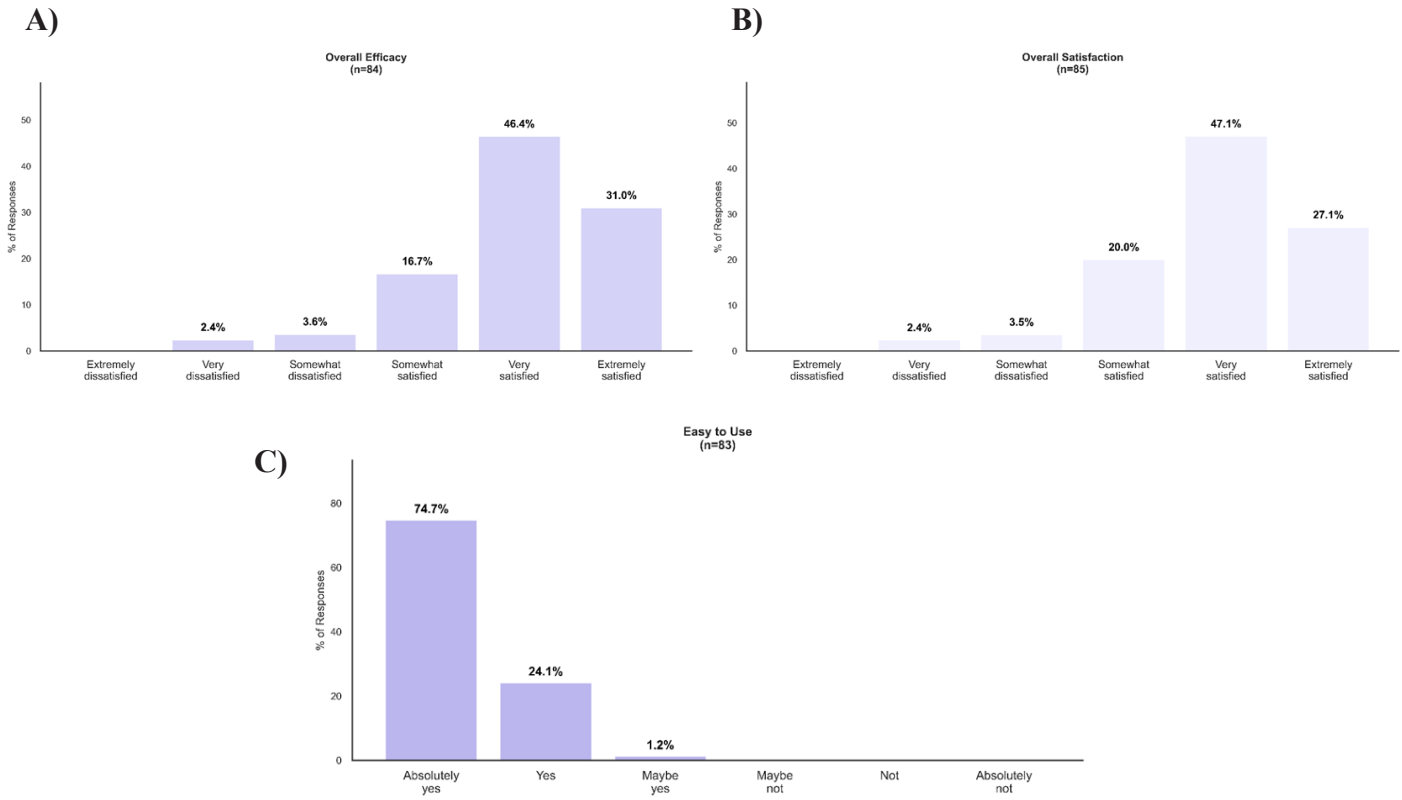

Figure 6: Consumer satisfaction and ease of use. Patient-reported ratings for overall (A) efficacy (n=84), overall (B) satisfaction (n=85), and (C) ease of use (n=83). Response distributions shown as percentage of total respondents per category.

Ease of use was also assessed and rated very favorable (n=83). Nearly all respondents described the device as easy to use, with 74.7% selecting "Absolutely yes" and 24.1% selecting "Yes" **(Figure 6C)**. Only 1% selected "Maybe yes," and no negative responses were recorded, suggesting that HSS was perceived as simple and convenient to use.

These findings were further supported by strong participant intentions regarding future product use and recommendation. Most respondents (n=85) indicated that they would purchase HSS again, with 59% selecting "Absolutely yes" and 28% selecting "Yes" (data not shown). Similarly, 89.3% of respondents (n=84) stated that they would recommend HSS, including 53.6% "Absolutely yes" and 35.7% "Yes" responses (data not shown). Taken together, these results suggest that HSS was well received by patients, with high levels of perceived efficacy and satisfaction, excellent usability, and strong willingness to use or recommend the product in the future.

Safety and Device performance:

The safety and tolerability of HSS were assessed based on adverse events reported by participants during the survey period. The most commonly reported adverse event was nasal irritation, noted in 7 patients (8.2%), of whom one case occurred in a pediatric patient. One case of epistaxis was reported in the adult population (1.2%). The adverse events were mild in nature, and no serious adverse events were reported during the study period.

Device performance was also assessed; no technical issues were reported during use (n=79).

Overall, these findings support the continued use of HSS as a well-tolerated option in the management of sinonasal conditions.

Analysis of Pediatric Cohorts:

Five of the 85 patients enrolled in the present study were aged <18 years. These patients were included in the primary analysis and are also presented separately **(Table 1; Cohort A)**. Because this sample was too small to draw meaningful conclusions regarding pediatric use, we additionally report descriptive findings from a second independent pediatric cohort **(Table 1; Cohort B)**. This cohort was enrolled in a separate study evaluating the same product that was initiated shortly before the COVID-19 pandemic in Greece but discontinued prematurely because of the pandemic. Complete data were available for six pediatric participants before study termination. These data are

Table 1: Baseline Characteristics — Pediatric Cohorts.

Variable	Cohort A	Cohort B
N	5	6
Age median (y)	14	9.5
Age range (y)	6–15	6–12
Sex	Male: 5	Male: 5; Female: 1
Diagnosis	Common cold & flu: 4; Sinusitis: 1	Viral rhinitis: 4; Allergic rhinitis: 2

presented for descriptive purposes only and were not combined with those of the present study for statistical analyses.

Baseline characteristics are presented in **Table 1**. The cohorts were analyzed separately because they were assessed using different instruments. Cohort A completed the same 0–6 pre-/post-treatment symptom severity and product evaluation scales used in the main study, whereas Cohort B completed an eight-item agreement questionnaire scored from 0 to 10. Given the small sample sizes, all analyses are descriptive, and no inferential statistical testing was conducted.

In Cohort A, the five children were evaluated using the same symptom severity scale applied in the main study (0–6 scale). Following HSS use, symptom severity decreased by a mean of 64.5% across the ten assessed domains, with improvements observed in nasal and quality-of-life-related symptoms **(Figure 7A)**.

In Cohort B, the six children were assessed using a separate eight-item questionnaire scored from 0 to 10 (higher scores indicating greater agreement), and results are therefore presented on the original scale. Mean scores exceeded 6.0/10 across all eight items, including the three symptom-related items (Q1–Q3: faster symptom improvement, nasal cleansing, and reduced nasal congestion) **(Figure 7B)**.

To summarize safety and acceptability across all 11 children, the two cohorts were combined descriptively. Across both cohorts, two of the 11 children reported mild, transient nasal irritation or discomfort, one in each cohort. The event in Cohort B was associated with the intensity of the eucalyptus scent. No serious adverse events, additional adverse events, or device malfunctions were reported **(Figure 8A)**.

An exploratory cross-cohort summary was generated for four acceptability dimensions: overall satisfaction, perceived efficacy, ease of use, and willingness to re-use/recommend. These dimensions were selected because they were the only measures captured, either directly or through equivalent items, in both cohorts. All scores were expressed on a common 0–10 scale, with the Cohort A ratings linearly rescaled from their original 1–6 scale (higher = better). In Cohort A, mean satisfaction and perceived efficacy were both 5.2/6 (8.4/10 after rescaling) and ease of use was 1.0/6 (10.0/10), while willingness to recommend/re-use corresponded to 1.6 (8.8/10) on the harmonized scale. In Cohort B, scored directly on a 0–10 scale, satisfaction was 8.0/10 (Q8), ease of use 9.3/10 (Q6), and willingness to re-use 8.5/10 (Q7). Because Cohort B did not include a single overall-efficacy item, perceived efficacy for that cohort was approximated by the mean of its three efficacy-related items (Q1–Q3: faster symptom improvement, nasal cleansing, and reduction of nasal congestion; 7.2/10). Averaged across all 11 children, the pooled scores were high, with overall satisfaction of 8.2/10, perceived efficacy of 7.8/10, ease of use of 9.6/10, and willingness to re-use/recommend of 8.6/10 **(Figure 8B)**. This combined summary is descriptive only and, given the small samples and the different source instruments, should not be interpreted as a formal pooled analysis.

Taken together, the descriptive findings from both pediatric cohorts (n=11, age range 6–15 years) are consistent with the safety and performance profile observed in the adult population of the main study. Despite the use of different measurement instruments, both cohorts independently demonstrate significant improvement in nasal congestion and related sinonasal symptoms, high ease of use, and a favorable tolerability/safety profile with no serious adverse events. Nasal congestion showed improvement in both cohorts: a 52.2% reduction in Cohort A and a mean agreement score of 7.5/10 for congestion

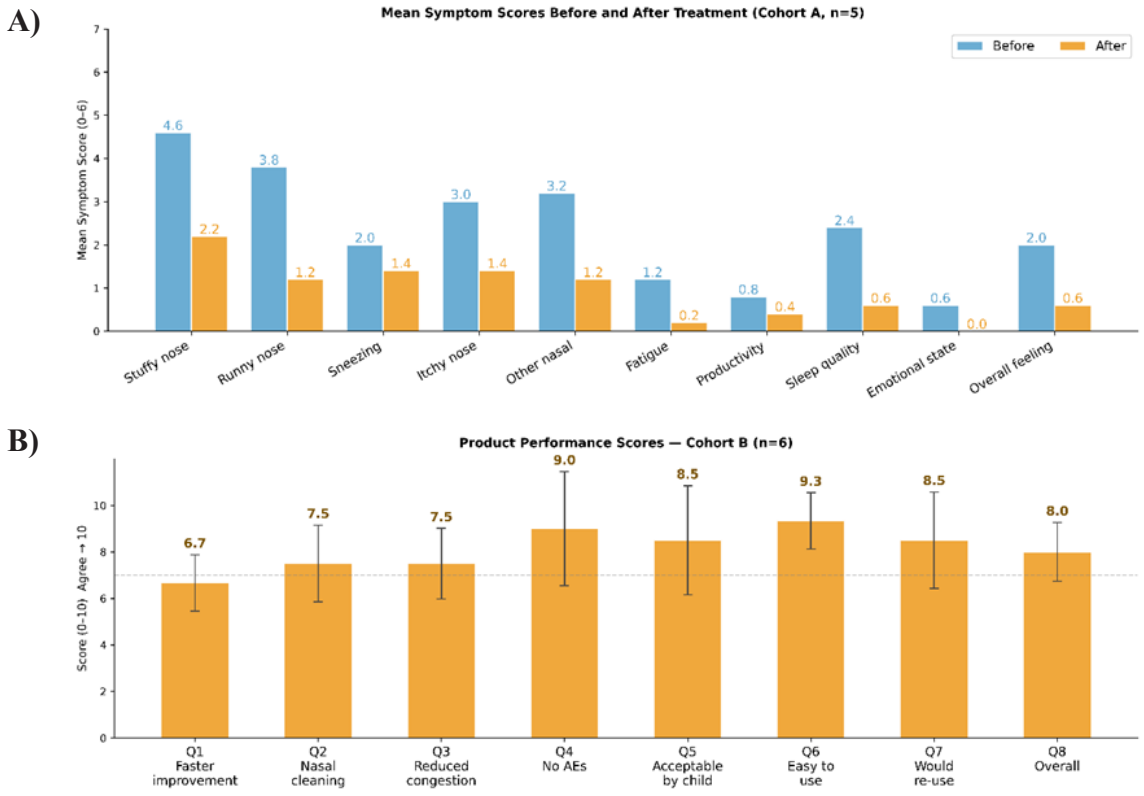

Figure 7: Pediatric cohort symptom and performance outcomes. (A) Mean symptom severity scores before (blue) and after (orange) HSS use across ten domains in Cohort A (n=5; scale 0–6). (B) Product performance agreement scores (scale 0–10, higher = greater agreement) across eight questionnaire items in Cohort B (n=6). Dashed line indicates the score ≥7 threshold. Error bars represent standard deviation.

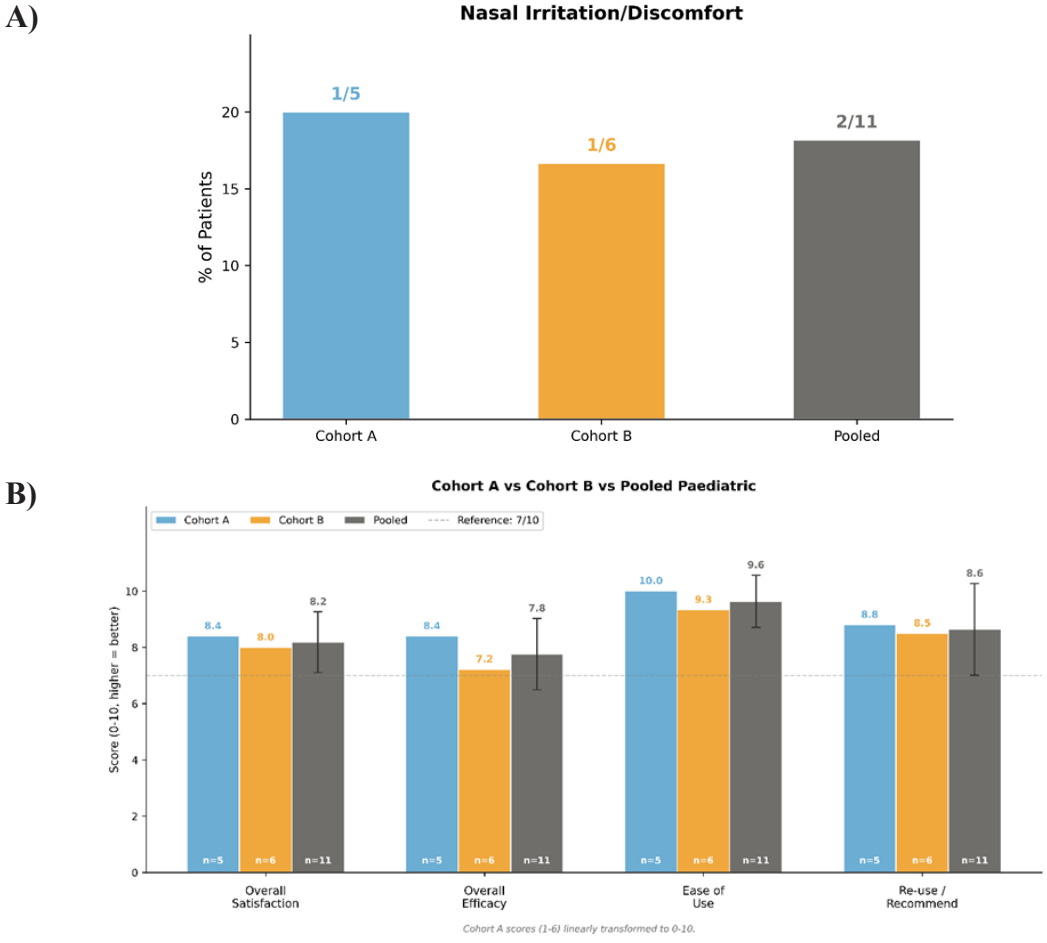

Figure 8: Combined pediatric safety and performance summary. (A) Frequency of nasal irritation/discomfort in Cohort A (n=5), Cohort B (n=6), and the combined pediatric population (n=11). All cases were mild and resolved without intervention. (B) Comparative overview of overall satisfaction, overall efficacy, ease of use, and willingness to re-use/recommend scores for Cohort A, Cohort B, and the combined pediatric population (n=11), expressed on a harmonized 0–10 scale (Cohort A scores linearly rescaled from 1–6). Error bars represent standard deviation. Dashed line indicates the score ≥7 reference threshold.

reduction in Cohort B. These observations, although exploratory and limited by small sample sizes, extend the real-world performance profile of HSS to a pediatric population and are consistent with existing pediatric safety and efficacy data reported for this product class [9,14].

Discussion

This prospective real-world user survey showed that HSS, a 2.3% hypertonic seawater nasal spray enriched with algal and herbal ingredients, was associated with clinically significant improvement in sinonasal symptoms among patients with ENT conditions, predominantly URTIs. These improvements were followed by a rapid onset of perceived symptom relief and a favorable tolerability profile, supporting the potential role of HSS as a non-pharmacological option for the symptomatic management of these conditions in routine practice.

Nasal congestion and rhinorrhea showed marked improvement following HSS treatment. These findings are consistent with the established mechanisms of action of hypertonic saline nasal irrigation, including osmotic reduction of mucosal edema, enhancement of mucociliary clearance, and mechanical removal of mucus and potential pathogens [2,3,7]. Given the high proportion of participants diagnosed with common cold and influenza, these observations are clinically relevant, as nasal obstruction and excessive nasal secretions represent some of the most common and burdensome symptoms associated with these conditions. In addition, the rapid onset of perceived symptom improvement represents an important clinical characteristic of this formulation. Nearly half of the participants reported noticeable improvement within 5 minutes of the first application, while the majority experienced symptom relief within the first two to three days of use. This pattern suggests that continued use may contribute to progressive symptom improvement, potentially through sustained enhancement of mucociliary function.

The HSS safety profile observed in this study was favorable overall, with adverse events being mild, and limited primarily to transient nasal irritation and a single episode of epistaxis. No device malfunctions were reported. These findings are consistent with the established tolerability profile of hypertonic saline formulations [3,7].

Among patients using concomitant medication, a considerable proportion reported reduced medication use during HSS treatment. This observation aligns with previous evidence indicating that nasal irrigation may reduce the need for symptomatic therapies, including decongestants, antihistamines, and antibiotics in selected patients [5,9]. Although these observations are based on patient-reported outcomes, they suggest that HSS may represent a useful supportive approach alongside conventional symptomatic treatments.

Patient satisfaction and product acceptability data further support the suitability of HSS for real-world use, consistent with previous findings in ENT patients using the same formulation [15] and other real-world surveys and clinical studies of seawater-based nasal sprays [14,16–18].

Moreover, the findings of this study complement the growing body of clinical evidence supporting this product. Gangadi et al. (2022) reported a significant reduction in sinonasal viral load, accompanied by marked symptom improvement in hospitalized patients with COVID-19 and no reported adverse events [17]. These findings were subsequently supported by a prospective randomized controlled trial [18]. Furthermore, real-world studies of similar seawater-based nasal spray formulations have consistently reported high patient-reported efficacy, rapid symptom relief, and favorable safety profiles [14,16]. Recent multicenter studies have also demonstrated greater improvements in nasal symptoms and quality of life with algae-enriched hypertonic seawater sprays compared with isotonic saline in patients with rhinosinusitis, allergic rhinitis, and following endoscopic sinus surgery [19–21].

Notably, these benefits were not confined to adults: across two small pediatric cohorts, HSS showed a comparable profile of relief, usability, and tolerability, adding real-world experience in an age group for which evidence on hypertonic seawater sprays remains limited [9,14]. However, these pediatric observations are exploratory and would need confirmation in larger, prospectively designed studies. Collectively, these findings support the use of HSS as a well-tolerated symptomatic treatment for sinonasal symptoms associated with URTIs and related ENT conditions, either alone or alongside other symptomatic therapies.

Limitations

Several limitations of this study should be acknowledged. First, the single-arm, uncontrolled design precludes causal attribution of the observed symptom improvements to HSS. All outcomes were based on patient self-report and are therefore subject to reporting and recall bias. Furthermore, the absence of objective clinical assessments, such as nasal endoscopy, microbiological analyses, or validated disease-specific patient-reported outcome measures (e.g., SNOT-22), limits the ability to correlate symptom improvement with objective clinical parameters. Nevertheless, the consistency of improvements observed across multiple symptom and quality-of-life domains, together with the favorable safety and tolerability profile, supports the real-world utility of HSS in the symptomatic management of URTIs.

Conclusion

This prospective real-world user survey study demonstrates that HSS, a 2.3% hypertonic seawater nasal spray enriched with algal and herbal ingredients, is associated with statistically significant, consistent improvement in sinonasal symptom burden, rapid onset of action, a favorable safety and tolerability profile, and high levels of user satisfaction in patients with ENT conditions, predominantly upper respiratory tract infections, in real-world clinical practice. These findings support the continued use of HSS as an adjunctive option for the symptomatic management of these conditions.

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