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Original Article

Comparative Evaluation of Oxymetazoline, Xylometazoline, and Placebo Nasal Sprays on Odor-Specific Olfactory Perception and Cognitive Function in Healthy Adults: A Randomized Double-Blind Placebo-Controlled Crossover Pilot Study

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A R T I C L E I N F O

Keywords:
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A B S T R A C T

Background: Intranasal decongestants such as oxymetazoline and xylometazoline are topical α-adrenergic agonists widely used for nasal obstruction. Their short-term effects on olfactory perception and cognitive performance remain incompletely understood. Aim: To compare the acute effects of oxymetazoline, xylometazoline, and placebo nasal sprays on olfactory perception, short-term cognitive performance, and subjective nasal patency in healthy adults. Methods: In this randomized, double-blind, placebo-controlled, three-arm crossover pilot study, 24 healthy normosmic adults (18-35 years) received oxymetazoline 0.05%, xylometazoline 0.1%, and placebo (0.9% saline) in a Latin-square sequence with 48-hour washout periods. Olfactory perception (modified 5-item odor identification test and odor intensity visual analogue scale [VAS]), cognitive performance (5-word recall and Stroop test), and nasal patency (VAS) were assessed at baseline and 10, 30, and 60 minutes post-administration. Data were analyzed using repeated-measures ANOVA with Bonferroni correction.[KIMS/IEC/A320/M/2025, CTRI/2025/07/091690] Results: All 24 participants (mean age 26.5±5.0 years; 50% female) completed the study. Odor identification scores did not differ significantly between treatments at any time point (all $p>0.05$). Odor intensity ratings were significantly lower with xylometazoline, with the greatest reduction observed at 30 minutes compared with oxymetazoline and placebo ($p = 0.001$). Both active treatments demonstrated higher 5-word recall scores than placebo at 10 minutes ($p<0.001$), although these differences were not sustained at later assessments. Stroop test performance did not differ significantly between treatments (all $p>0.05$). Subjective nasal patency improved significantly with both active treatments compared with placebo (all $p<0.001$), with earlier improvement observed with xylometazoline and greater improvement at 30 minutes with oxymetazoline. No significant carryover effects or clinically significant adverse events were observed. Conclusion: Oxymetazoline and xylometazoline significantly improved subjective nasal patency without affecting odor identification or attention. Xylometazoline reduced perceived odor intensity, and both agents were associated with transiently higher early recall scores. These findings suggest subtle time-dependent sensory and cognitive effects that warrant confirmation in larger studies.

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INTRODUCTION

Topical nasal decongestants such as oxymetazoline (a selective α1 and partial α_2 agonist) and xylometazoline (primarily an α2 agonist) are fast-acting imidazoline derivatives that relieve nasal congestion by inducing α-adrenergic–mediated vasoconstriction of nasal mucosal vessels and restoring airflow.[3]

These agents induce α-adrenergic–mediated vasoconstriction of nasal mucosal blood vessels, reducing tissue edema and improving nasal airflow.[1-3] Improved nasal patency could let odorant molecules reach the olfactory cleft more effectively, which could lead to an improvement in olfactory perception.

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The perception of odor involves a network of molecular pathways that are concentrated in the olfactory bulb and distributed throughout the brain.[4] Nasal breathing rhythmically entrains both slow and fast neural oscillations in the olfactory bulb, piriform cortex, amygdala, and hippocampus, boosting emotion recognition, memory encoding, and consolidation effects that are abolished during mouth breathing and highlight the importance of nasal airflow in cognitive processing.[5]

Nasal obstruction represents a considerable concern that affects the quality of life of the patient.[1] It is strongly associated with poor sleep quality, insomnia, and increased risk of obstructive sleep apnea (OSA).[2] Although oxymetazoline and xylometazoline are widely used to relieve nasal congestion and improve airflow, the extent to which they enhance olfactory perception and whether this translates into cognitive effects remains unclear.

We hypothesized that intranasal alpha-adrenergic decongestants would improve nasal patency and modulate olfactory perception, with potential secondary effects on short-term cognitive performance. Furthermore, there is no controlled crossover study comparing these two decongestants directly on both olfactory and cognition in healthy adults. Although topical nasal decongestants are widely used to improve nasal airflow, their effects on olfactory perception and short-term cognitive performance have not been systematically evaluated. Therefore, this study compared the acute effects of oxymetazoline, xylometazoline, and placebo on olfactory perception, cognitive performance, and subjective nasal patency in healthy adults.

Study Objective

Primary objective: To compare the acute effects of oxymetazoline, xylometazoline, and placebo nasal sprays on olfactory perception in healthy adults, as assessed by odor identification and odor intensity scores.

Co-primary objective: To evaluate the effects of the interventions on short-term cognitive performance, including attention and memory recall.

Secondary objective: To compare changes in subjective nasal patency following administration of the study drugs.

Materials and Methods

Subjects and study design

This randomized, double-blind, placebo-controlled, prospective, three-arm, three-period crossover pilot study was conducted in 24 healthy normosmic adults aged 18-35 years. The study followed a three-period, three-treatment crossover design. Each participant received all interventions in randomized order. Treatment sequences were generated using a computer-based Latin-square randomization method. The allocation sequence was prepared by an independent investigator not involved in enrollment or assessment, and allocation concealment was ensured using sequentially numbered, opaque, sealed envelopes.

The study adhered to the principles of the Declaration of Helsinki and International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines. Approval was obtained from the Institutional Ethics Committee, and the trial was registered with the Clinical Trials Registry-India [KIMS/IEC/A320/M/2025, CTRI/2025/07/091690]. Participant recruitment was conducted between September 2025 and November 2025. Written informed consent was obtained from all participants. Participant enrolment, randomization, follow-up, and analysis are summarized in Figure 1.

A total of 24 volunteers, aged 18-35 years, participated (12 males and 12 females). Participants were recruited through institutional advertisements and voluntary enrollment. All participants were in excellent health as established by a thorough physical examination and a detailed history. All the participants were screened and found to be free from acute or chronic nasal or sinus disease, no history of olfactory dysfunction, and were not using medications known to affect nasal patency, cognition,

Results

Baseline Characteristics

A total of 24 healthy participants (12 males and 12 females) with a mean age of 26.54 ± 4.99 years were included in the study. Baseline olfactory function was within normal limits, with a mean odor identification score of 4.64 ± 0.61 and odor intensity of 2.39 ± 0.66. Baseline cognitive performance demonstrated a mean recall score of 3.75 ± 0.63, Stroop reaction time of 67.08 ± 3.78 seconds and Stroop interference score of 2.66 ± 1.19. Mean nasal patency score at baseline was 1.57 ± 0.43. (Table 1).

or olfaction. Participants were screened using a brief questionnaire and a modified 5-item odor identification test adapted from the Sniffin' Sticks identification subtest, to confirm normosmia.[8] The odorants included rose, clove, mint, lemon, and coffee. Participants identifying all odors correctly were included in the study. Similar inclusion of healthy volunteers has been employed in prior intranasal pharmacological studies assessing chemosensory and cognitive outcomes.[6] The study included (1) Healthy human volunteers aged 18-35 years, (2) Normosmic subjects and excluded subjects with (1) Nasal disorders, allergies, chronic rhinitis, current smokers, history of olfactory dysfunction, (2) Upper respiratory tract infection in the past 4 weeks, (3) Neurological or psychiatric disorders, (4) Cardiovascular disease or hypertension, (5) Current use of decongestants or antihistaminics, (6) Pregnancy or lactation, (7) Known hypersensitivity to study drugs.

Participants were allocated to one of six Latin-square sequences to ensure balanced treatment ordering across the study population. The study followed a double-blind design in which participants and investigators responsible for outcome assessment and data analysis were blinded to treatment allocation. Study medications were labeled as Spray A, Spray B, and Spray C and dispensed in identical metered-dose nasal spray bottles with the same appearance, volume, and delivery mechanism to maintain blinding.

Interventions

Three intranasal interventions were used. Spray A: Oxymetazoline hydrochloride 0.05%, Spray B: Xylometazoline hydrochloride 0.1%, and Spray C: Placebo (0.9% normal saline). Each participant received all three sprays in randomized order with a 48-hour washout period between sessions. A 48-hour washout period was selected based on the pharmacodynamic duration of topical imidazoline decongestants, with oxymetazoline acting for approximately 6–8 hours and xylometazoline providing decongestant effects for up to 10–12 hours, thereby minimizing potential carryover effects.[12, 13] At each visit, one puff (approximately 0.1 mL per actuation) was administered into each nostril using identical blinded spray applicators. This corresponded to approximately 0.05 mg per puff for oxymetazoline (0.05%) and 0.1 mg per puff for xylometazoline (0.1%), while the placebo consisted of 0.9% normal saline without active pharmacological agent. Spray administration was performed 5 minutes after baseline assessment with the participant in a seated position and head in neutral alignment to ensure consistent delivery.

Baseline assessments:

Baseline measurements included olfactory, cognitive, and nasal patency assessments.

(1)Baseline Olfactory Assessment: Olfactory perception was assessed using a 5-item odor identification test consisting of rose, clove, mint, lemon, and coffee. This brief test, although practical, may have limited sensitivity compared to full standardized olfactory testing batteries. Odorants were presented using cotton applicators impregnated with odorant solutions, ensuring uniform delivery across participants. Each stimulus was presented bilaterally at a standardized distance of approximately 2 cm from the nostrils for 3–5 seconds. Participants identified each odor, and the number of correctly identified odors was recorded as the odor identification score (0–5). Participants were given up to 10 seconds to identify each odor following presentation. Odor

intensity was measured using a visual analogue scale (VAS), ranging from 0 (no odor) to 10 (maximum intensity), a validated method for subjective sensory perception assessment. [7]

(2)Baseline Cognitive Assessment: Baseline cognitive performance was assessed prior to intervention. Attention was evaluated using an app-based Stroop test, which measured reaction time and interference control. The use of smartphone-based Stroop testing has been shown to be a valid and reliable method for assessing cognitive performance.[9] Memory performance was assessed using a five-word immediate recall test, in which participants were presented with five unrelated words and asked to recall them after a brief interval of approximately 30 seconds.

The five-word test is a quick and practical verbal memory assessment tool validated for assessing episodic memory performance. The number of correctly recalled words was recorded as the memory score (0–5). [10] Cognitive assessments were conducted in a quiet, distraction-free environment with participants seated comfortably. The Stroop test and memory recall tasks were administered using a standardized digital interface under consistent conditions. Participants maintained a viewing distance of approximately 40–50 cm from the screen. Standardized instructions were provided prior to testing, and brief familiarization trials were conducted to minimize learning effects.

(3)Baseline Nasal Patency Assessment: Subjective nasal patency was assessed using a 10-cm visual analogue scale (VAS). Assessments were performed with participants seated upright, breathing normally through both nostrils under standardized conditions. Participants were instructed to rate their overall perception of nasal airflow at each time point. Participants rated nasal airflow from 0 (completely open) to 10 (completely blocked). The distance in centimeters from the left end of the scale to the participant's mark was recorded as the nasal patency score.[11]

Following baseline assessments, the assigned nasal spray was administered at +5 minutes, with one puff delivered into each nostril using identical blinded spray applicators. Assessments were repeated at 10, 30, and 60 minutes post-administration to evaluate the early time course of pharmacodynamic effects following intranasal decongestant use. At each time point, the following parameters were assessed: Odor identification score, Odor intensity (VAS), Stroop test reaction time, 5-word recall score and Nasal patency (VAS). To minimize olfactory desensitization, odor presentations were separated by approximately 30 seconds between stimuli. Vital signs, including heart rate and blood pressure, were recorded at baseline and at 10, 30, and 60 minutes following spray administration to monitor potential systemic effects of the interventions. Participants were monitored throughout the study period for adverse events.

Data were recorded using standardized case report forms (CRFs). VAS scores were measured in centimeters, Stroop test results were collected digitally, memory recall scores were recorded numerically and olfactory scores ranged from 0-5. All data were entered into a structured dataset for statistical analysis.

Statistical Analysis:

Data were analyzed using two-way repeated-measures ANOVA with treatment and time as within-subject factors. Effect sizes were expressed as partial eta-squared (η^2). In accordance with crossover trial methodology, carryover effects were assessed using treatment-by-period interaction terms, and period effects were evaluated separately. Where significant effects were observed, Bonferroni-adjusted post-hoc comparisons were performed. A p-value < 0.05 was considered statistically significant. As all participants completed all study periods, no missing data imputation was required.

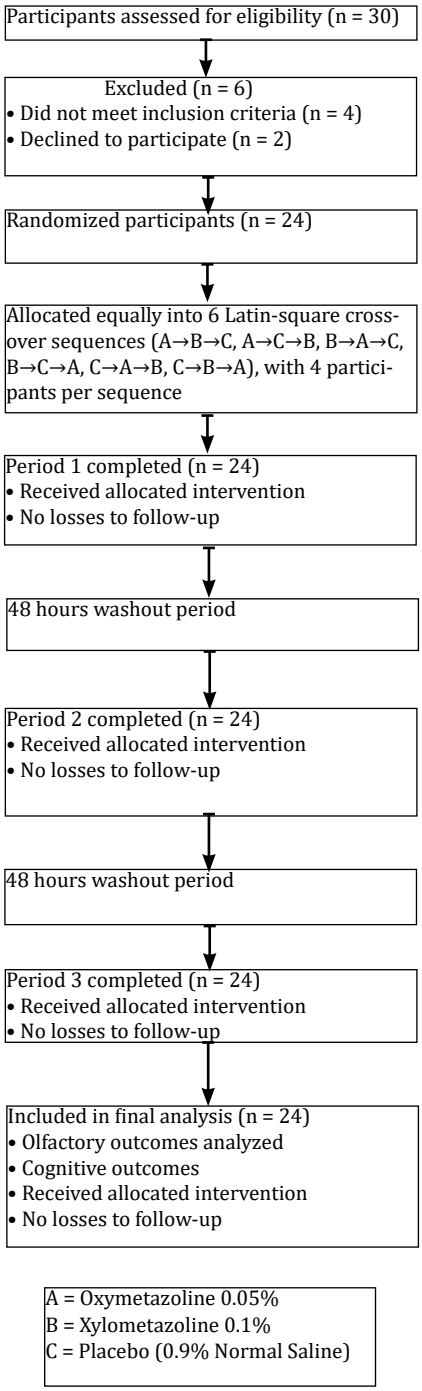


Figure 1. CONSORT flow diagram of participant enrolment, randomization, crossover allocation, follow-up, and analysis in the randomized double-blind placebo-controlled pilot study

Table 1. Baseline demographic and clinical characteristics of study participants (n = 24)

Characteristic	Overall
DEMOGRAPHIC CHARACTERISTICS	
Age (years), mean ± SD	26.5 ± 5.0
Age range (years)	18–34
Sex	
Male, n (%)	12 (50.0)
Female, n (%)	12 (50.0)

BASELINE CLINICAL PARAMETERS, mean ± SD	
Odor Identification Score (0–5)	4.64 ± 0.61
Odor Intensity, VAS (0–10)	2.39 ± 0.66
5-Word Recall Score (0–5)	3.75 ± 0.63
Stroop Reaction Time (s)	67.08 ± 3.78
Stroop Interference Score	2.66 ± 1.19
Nasal Patency, VAS (0–10)	1.57 ± 0.43

Values are presented as mean ± SD. Baseline values represent pooled pre-intervention measurements across study periods.

Olfactory Outcomes

Odor identification scores remained stable across treatments and timepoints (Table 2). Mean scores ranged from 4.38 ± 0.71 to 4.75 ± 0.44 across all conditions. Repeated measures ANOVA demonstrated no significant main effect of treatment on odor identification ($p > 0.05$), with a negligible effect size (partial $\eta^2 < 0.05$). There was also no significant treatment × time interaction. Post hoc Bonferroni comparisons confirmed no significant pairwise differences between oxymetazoline, xylometazoline, and placebo at any timepoint.

Odor intensity scores showed a reduction over time, particularly in the xylometazoline group (Table 2). At 30 minutes, mean odor intensity was lowest with xylometazoline (1.52 ± 0.71) compared to oxymetazoline (2.06 ± 0.83) and placebo (2.10 ± 0.59). Repeated measures ANOVA revealed a significant main effect of treatment on odor intensity ($p < 0.05$), with a moderate effect size (partial $\eta^2 \approx 0.10–0.15$). A significant treatment × time interaction was also observed. Post hoc Bonferroni analysis demonstrated that xylometazoline significantly reduced odor intensity compared to placebo at 30 minutes ($p < 0.05$). Differences at 10 and 60 minutes followed a similar trend but did not consistently meet corrected significance thresholds.

Table 2. Effects of oxymetazoline, xylometazoline, and placebo on olfactory perception across study time points

Olfactory outcomes across treatments and timepoints (mean ± SD)					
Outcome	Treatment	Baseline	10 min	30 min	60 min
Odor Identification Score (0–5)	Drug A	4.67 ± 0.56	4.63 ± 0.58	4.71 ± 0.55	4.75 ± 0.44
	Drug B	4.58 ± 0.65	4.38 ± 0.71	4.42 ± 0.72	4.54 ± 0.59
	Placebo	4.67 ± 0.64	4.50 ± 0.59	4.50 ± 0.66	4.71 ± 0.46
	p-value	0.748	0.331	0.51	0.42
Odor Intensity (VAS 0–10)	Drug A	2.42 ± 0.69	2.33 ± 0.64	2.06 ± 0.83	2.00 ± 0.78
	Drug B	2.44 ± 0.63	1.90 ± 0.74	1.52 ± 0.71	1.63 ± 0.89
	Placebo	2.31 ± 0.67	2.25 ± 0.64	2.10 ± 0.59	2.02 ± 0.63
	p-value	0.66	0.014	0.001	0.015

P-values represent between-treatment comparisons at each time point. Data are presented as mean ± SD.

Cognitive Outcomes

Recall performance declined over time across all treatments, with more pronounced differences between interventions (Table 3). At 10 minutes, recall scores were higher for oxymetazoline (4.00 ± 0.59) and xylometazoline (4.04 ± 0.55) compared to placebo (3.13 ± 0.61). Repeated measures ANOVA demonstrated a significant main effect of treatment ($p < 0.001$) and time ($p < 0.001$), with a moderate effect size (partial $\eta^2 \approx 0.15–0.20$). A significant treatment × time interaction was also observed. Post hoc Bonferroni comparisons showed that both oxymetazoline and xylometazoline were associated with significantly higher recall scores compared to placebo at 10 minutes ($p < 0.05$). However, this effect diminished over time, with no significant differences observed at 60 minutes.

Stroop ON time and interference scores remained relatively stable across treatments (Table 3). Reaction times ranged from 66.18 ± 3.62 to 68.06 ± 4.26 seconds, while interference scores showed minimal variation. Repeated measures ANOVA showed no significant main effect of treatment on Stroop reaction time or interference ($p > 0.05$), with small effect sizes (partial $\eta^2 < 0.05$). No significant post hoc differences were observed.

Table 3. Effects of oxymetazoline, xylometazoline, and placebo on short-term cognitive function (memory and attention)

Cognitive outcomes across treatments and timepoints (mean ± SD)					
Outcome	Treatment	Baseline	10 min	30 min	60 min
A. Memory performance					
5 words recall Score (0–5)	Drug A	3.83 ± 0.56	4.00 ± 0.59	2.96 ± 0.62	2.79 ± 0.41
	Drug B	3.92 ± 0.58	4.04 ± 0.55	3.29 ± 0.62	3.04 ± 0.62
	Placebo	3.50 ± 0.72	3.13 ± 0.61	2.38 ± 0.82	2.50 ± 0.88
	p-value	**0.097**	**<0.001**	**<0.001**	**0.003**
B. Attention performance					
Stroop ON Time (sec)	Drug A	66.69 ± 3.69	66.56 ± 3.17	66.99 ± 3.31	67.15 ± 3.56
	Drug B	67.58 ± 4.54	68.06 ± 4.26	68.03 ± 4.20	66.18 ± 3.62
	Placebo	66.97 ± 3.10	67.50 ± 2.80	67.44 ± 2.78	67.21 ± 2.92
	p-value	0.582	0.275	0.311	0.115
Stroop Interference	Drug A	2.53 ± 1.20	2.42 ± 1.19	2.48 ± 1.37	2.35 ± 1.17
	Drug B	3.11 ± 1.41	2.81 ± 1.21	2.80 ± 1.16	2.86 ± 1.09
	Placebo	2.35 ± 0.94	2.65 ± 1.03	2.72 ± 1.27	2.59 ± 1.15
	p-value	0.149	0.722	0.882	0.247

Data are presented as mean ± SD. P-values represent between-treatment comparisons at each time point. Stroop ON Time indicates task completion time in seconds.

Nasal Patency

Nasal patency improved significantly following administration of active treatments (Table 4). At 30 minutes, oxymetazoline demonstrated the greatest reduction in obstruction score (0.44 ± 0.22), compared with xylometazoline (1.21 ± 0.39) and placebo (1.52 ± 0.68). Repeated-measures ANOVA revealed a significant main effect of treatment ($p < 0.001$) and time ($p < 0.001$), with a large effect size (partial $\eta^2 > 0.30$). A significant treatment × time interaction was also observed, indicating differential changes in nasal patency over time across treatments.

Post hoc Bonferroni analysis demonstrated significantly greater improvement in nasal patency with oxymetazoline and xylometazoline compared with placebo at post-administration assessments ($p < 0.001$). Oxymetazoline produced the most pronounced decongestant effect, reaching maximal improvement at 30 minutes (0.44 ± 0.22). Xylometazoline showed an earlier onset of action at 10 minutes (0.90 ± 0.29) but a comparatively smaller overall improvement thereafter. Placebo exhibited only minimal changes over time, with obstruction scores decreasing from 1.60 ± 0.68 at baseline to 1.40 ± 0.72 at 60 minutes.

No clinically significant adverse events were observed during the study. Heart rate and blood pressure remained stable across baseline, 10, 30, and 60 minutes.

Table 4. Effects of oxymetazoline, xylometazoline, and placebo on subjective nasal patency over time

Nasal patency score (VAS), mean ± SD				
Treat-ment	Baseline	10 min	30 min	60 min
Drug A	1.54 ± 0.25	1.52 ± 0.10	0.44 ± 0.22	0.88 ± 0.22
Drug B	1.58 ± 0.19	0.90 ± 0.29	1.21 ± 0.39	1.23 ± 0.25
Placebo	1.60 ± 0.68	1.60 ± 0.68	1.52 ± 0.68	1.40 ± 0.72
p-value	<0.001	<0.001	<0.001	<0.001

Lower scores indicate greater nasal patency (0 = completely open; 10 = completely blocked). Data are presented as mean ± SD.

No clinically significant adverse events were observed during the study. Heart rate and blood pressure remained stable across baseline, 10, 30, and 60 minutes.

Discussion:

This randomized double-blind crossover pilot study evaluated the effects of oxymetazoline, xylometazoline, and placebo nasal sprays on olfactory perception and cognitive performance in healthy adults. The findings demonstrate that while both decongestants significantly improved nasal patency, their effects on olfactory function and cognition were selective and transient.

In the present study, odor identification scores remained unchanged across treatments, indicating that acute administration of intranasal decongestants does not significantly alter higher-order olfactory processing. This suggests that short-term administration of topical nasal decongestants does not substantially alter higher-order olfactory processing such as odor recognition. This finding is consistent with previous studies reporting minimal or no significant effect of topical decongestants like oxymetazoline on olfactory function, despite improvements in nasal airflow.[12]

In contrast, odor intensity perception showed significant differences between treatments, particularly with xylometazoline, which produced lower intensity ratings at peak time points. This may reflect alterations in airflow dynamics or trigeminal stimulation rather than direct modulation of olfactory receptor function. Drug-induced modulation of chemosensory perception has been previously described and may occur through peripheral or central mechanisms affecting sensory processing.[4]

The study demonstrated significant treatment-related differences in short-term memory (recall scores), particularly at early time points. Both oxymetazoline and xylometazoline showed transient improvements compared to placebo at 10 minutes, suggesting a possible short-term facilitatory effect. One plausible explanation is the interaction between nasal airflow and central neural processes. Nasal breathing has been shown to entrain neural oscillations in the olfactory bulb, piriform cortex, amygdala, and hippocampus, thereby influencing memory encoding and cognitive processing. Improved nasal patency following decongestant use may enhance airflow to the olfactory cleft, thereby modulating these neural circuits.[4] However, this effect was not sustained over time, and recall performance declined across all groups at later time points, likely reflecting cognitive fatigue or task-related effects. Additionally, no significant differences were observed in Stroop performance, suggesting that executive function and attention were not influenced by intranasal decongestants. This aligns with evidence that not all intranasal pharmacological agents enhance cognition; for instance, intranasal esketamine has been shown to transiently impair rather than improve cognitive performance in healthy individuals.[6]

Both oxymetazoline and xylometazoline significantly improved nasal patency, consistent with their known mechanism of action as α-adrenergic agonists causing vasoconstriction of nasal mucosal vessels.[3] This kinetic difference may reflect the distinct receptor selectivity profiles of the two agents, with xylometazoline acting predominantly via α_2 receptors and oxymetazoline exhibiting combined α_1 and partial α_2 agonism, potentially contributing to differences in onset and duration of action. [3] The placebo arm showed only minimal changes over time, providing an appropriate internal control for comparison with the active treatments. Previous comparative studies have demonstrated that both agents produce similar and significant improvements in nasal airflow, with no major differences in efficacy.[3] Interestingly, despite marked improvements in nasal patency, this did not translate into enhanced odor identification, reinforcing the concept that olfactory perception is not solely dependent on airflow but also on complex central processing mechanisms.[4, 12]

Importantly, no clinically significant adverse events were observed, and vital signs remained stable throughout the study period, indicating that both agents were well tolerated in healthy individuals when used as single doses.

This study has limitations. The sample size was relatively small, limiting generalizability. The study population included only healthy young adults, and results may differ in patients with nasal pathology. Additionally, objective measures of nasal airflow such as rhinomanometry were not used, and cognitive effects were assessed using brief screening tools rather than comprehensive neuropsychological batteries. The modified 5-item olfactory assessment may have introduced ceiling effects and reduced sensitivity to detect subtle treatment-related changes.

Despite these limitations, this study provides preliminary evidence that topical nasal decongestants may influence nasal patency and may have transient effects on selected aspects of sensory perception and cognitive performance. Further adequately powered studies are warranted to confirm these observations and elucidate the underlying mechanisms.

Conclusion:

This randomized, double-blind, placebo-controlled crossover pilot study evaluated the acute effects of oxymetazoline and xylometazoline on olfactory perception, cognitive performance, and nasal patency in healthy adults. Both agents produced significant improvements in subjective nasal patency compared with placebo, confirming their expected decongestant effects. Despite these improvements, neither treatment significantly altered odor identification performance, suggesting that short-term enhancement of nasal airflow alone may not be sufficient to influence odor recognition.

Xylometazoline was associated with lower perceived odor intensity at selected time points, indicating that topical nasal decongestants may exert subtle effects on sensory perception beyond their decongestant action. In addition, both active treatments demonstrated transiently higher recall scores during early assessments, although these differences were not sustained over time and were not accompanied by changes in attention as measured by the Stroop test. These findings suggest that any cognitive

effects of intranasal decongestants are likely to be modest, selective, and time-dependent.

No clinically significant adverse events were observed, and both agents were well tolerated following single-dose administration. Overall, the findings indicate that oxymetazoline and xylometazoline effectively improve subjective nasal patency without adversely affecting olfactory identification or attentional performance in healthy individuals. Larger studies incorporating objective measures of nasal airflow and comprehensive olfactory assessment tools are warranted to confirm these observations and further explore the relationship between nasal patency, olfactory perception, and cognitive function.

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