

# Nasal Corticosteroid Delivery Methods in Chronic Rhinosinusitis With Polyps: A Systematic Review

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## Abstract

**Background:** Allergic rhinitis (AR) affects millions of people worldwide, impacting quality of life and causing economic burden. Intranasal corticosteroids (INCS) are the mainstay treatment for AR, delivered via aerosol or aqueous sprays.

**Methods:** Two independent reviewers searched four databases (Embase, Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, and Web of Science from January 1, 1980, to January 9, 2024) for English-language, prospective randomized controlled trial (RCT), comparing different delivery methods of corticosteroids for treatment of CRSwNP. Studies were excluded for specific reasons (wrong comparisons, wrong intervention, wrong patient population, wrong route of administration).

**Results:** The data search identified 2282 studies. After removing duplicates, 1,503 studies were screened by title and abstract, with 1,479 excluded for not meeting criteria. Eighteen full-text articles were assessed for eligibility, and five randomized control trials (RCTs) were included in the review. Both short- and long-term treatments with nebulizer, aerosol spray, and nasal drop methods demonstrated similar efficacy to oral corticosteroids (OCS) but with a better safety profile. Long-term use of aqueous sprays showed clinical improvement but was less effective than other non-aqueous delivery methods.

**Conclusions:** Non-aqueous delivery methods, including nebulizers, aerosol sprays, and nasal drops offer a safe alternative to OCS without systemic side effects. Patients using aqueous formulations should be advised on the importance of long-term adherence to achieve symptom improvement.

## Objective

This systematic review evaluates and compares the efficacy and safety of different intranasal corticosteroid delivery methods for treating chronic rhinosinusitis with nasal polyps (CRSwNP).

## Results

Delivery methods	Short term		Long term	
	Efficacy	Safety	Efficacy	Safety
ocs	Most effective	Least safe (systemic AEs)	Most effective	Least safe (systemic AEs)
Non-aqueous	Highly effective	Favorable safety profile	Highly effective	Favorable safety profile
Aqueous	Least effective	Most favorable safety profile	Moderately effective	Most favorable safety profile

TABLE 1: Overview of the efficacy and safety profiles of different delivery methods of CRSwNP treatment

## Results

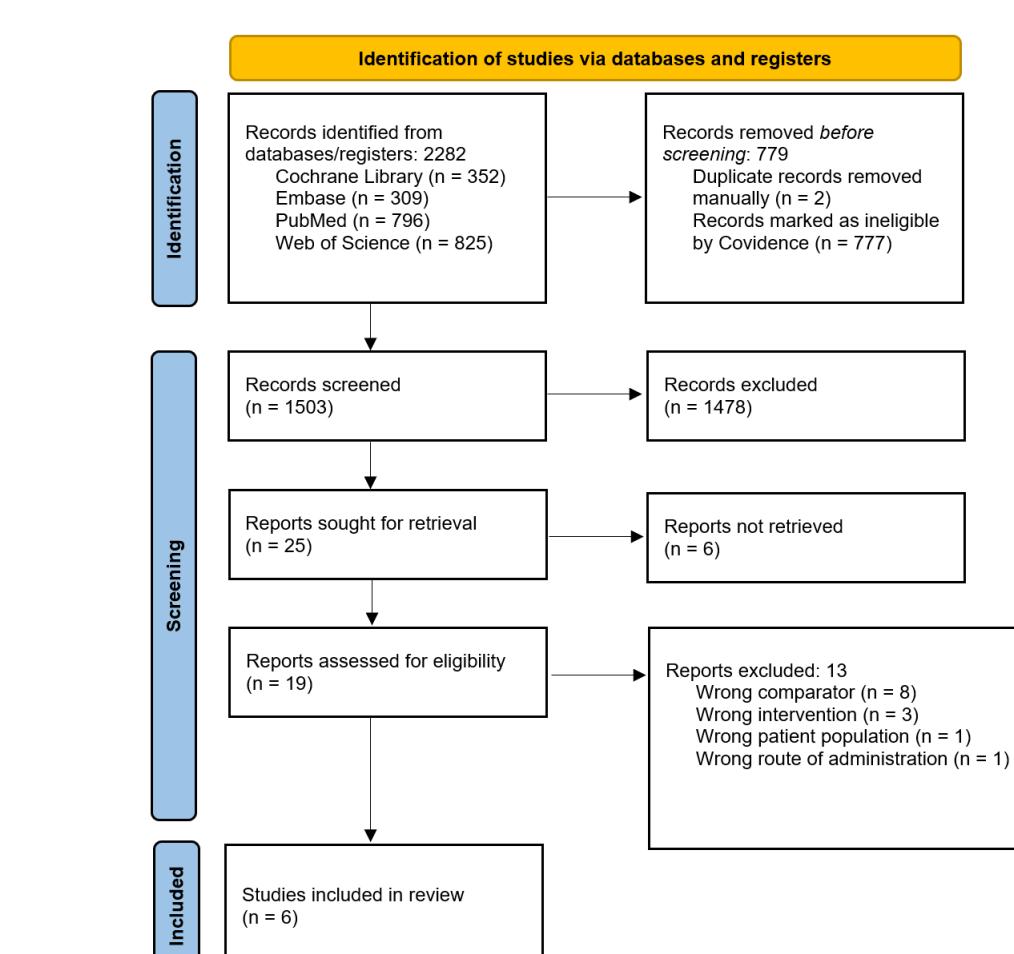


FIGURE 1: PRISMA Flow diagram of the literature search and selection process

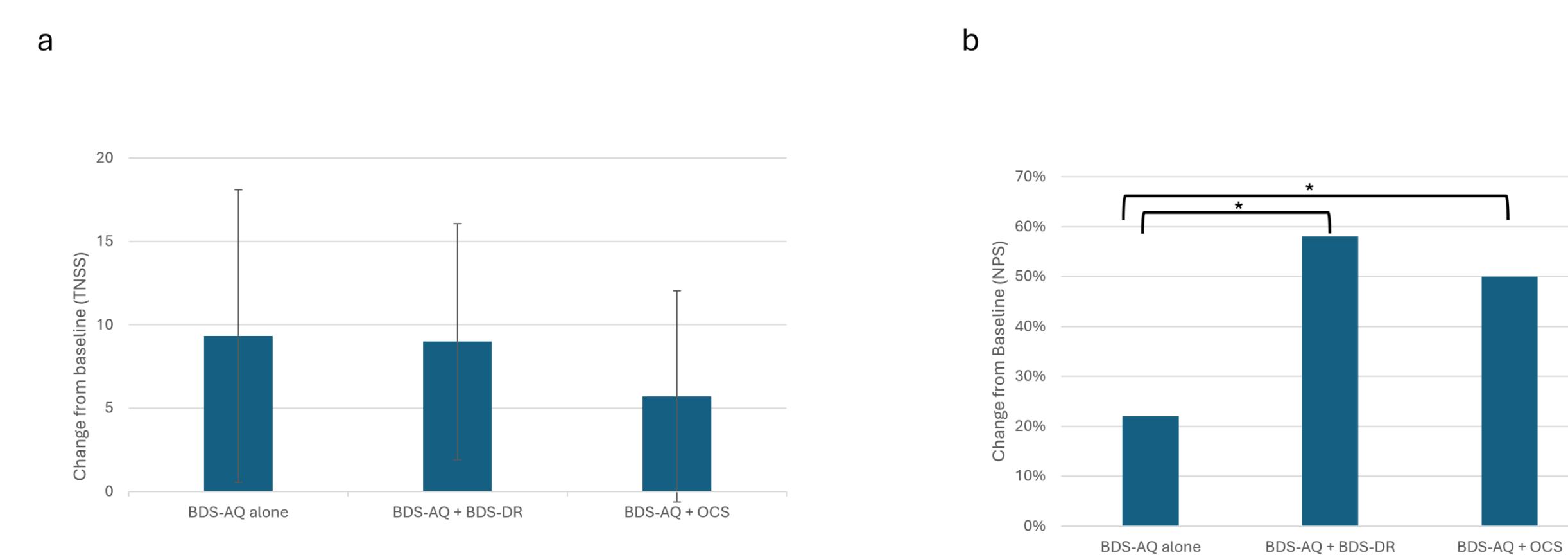


FIGURE 2: Short-term outcomes in Xu et al's RCT showing changes in (a) TNSS and (b) NPS after treatment with BDS-AQ, BDS-AQ + BDS-DR, and BDS-AQ + OCS. \*p<0.05 indicates a statistically significant difference.

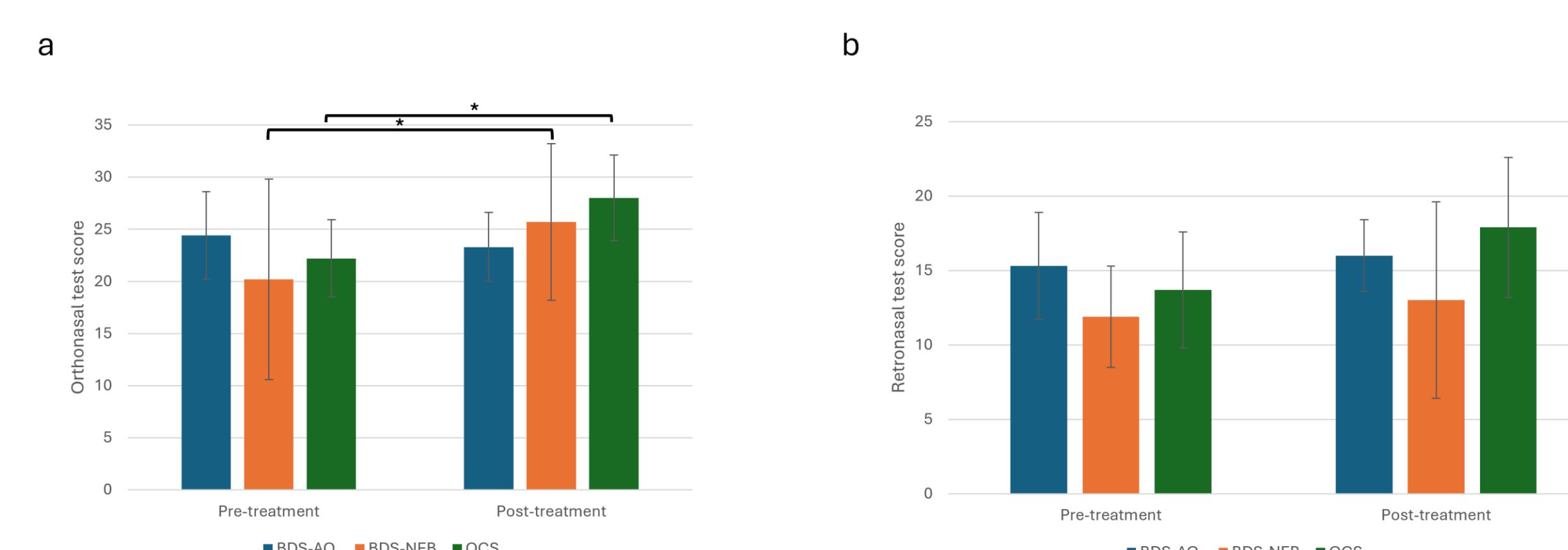


FIGURE 3: Short-term outcomes in Reyhler et al's RCT showing pre- and post-treatment changes in (a) Orthonasal and (b) Retronasal test score with BDS-AQ, BDS-NEB, and OCS. \*p<0.05 indicates a statistically significant difference.

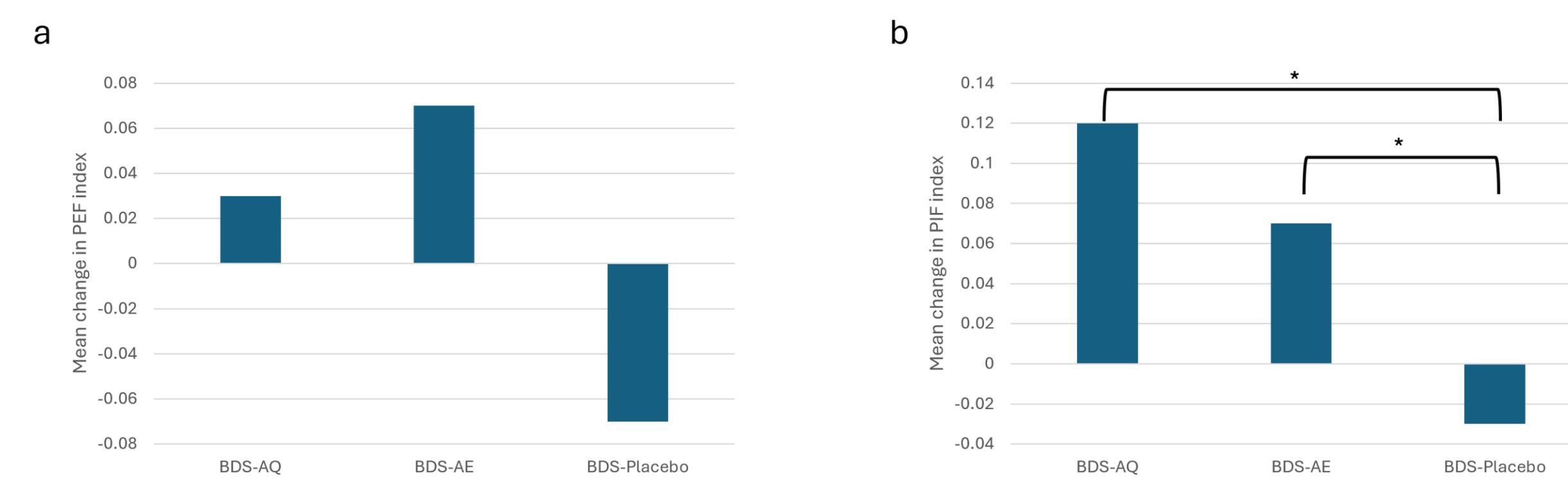


FIGURE 4: Long-term outcomes in Johansen et al's RCT showing mean changes in (a) PEF (b) PIF indices with BDS-AQ, BDS-AE, and placebo. \*p<0.05 indicates a statistically significant difference.

## Results

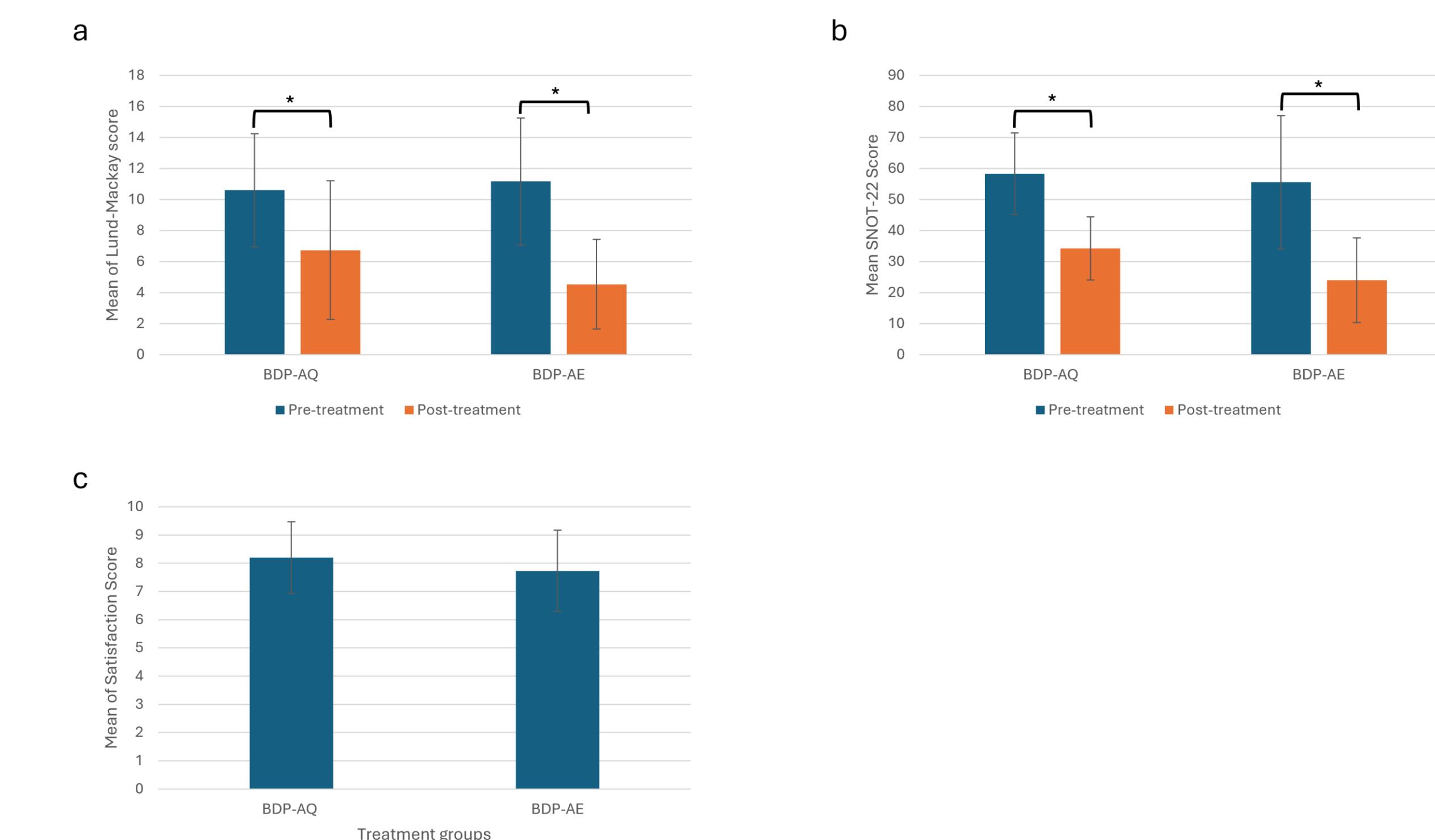


FIGURE 5: Long-term outcomes in Rezaeian et al's RCT showing changes in (a) Lund-Mackay score, (b) SNOT-22 score, and (c) Patient satisfaction score with aqueous BDP-AQ and BDP-AE. \*p<0.05 indicates a statistically significant difference.

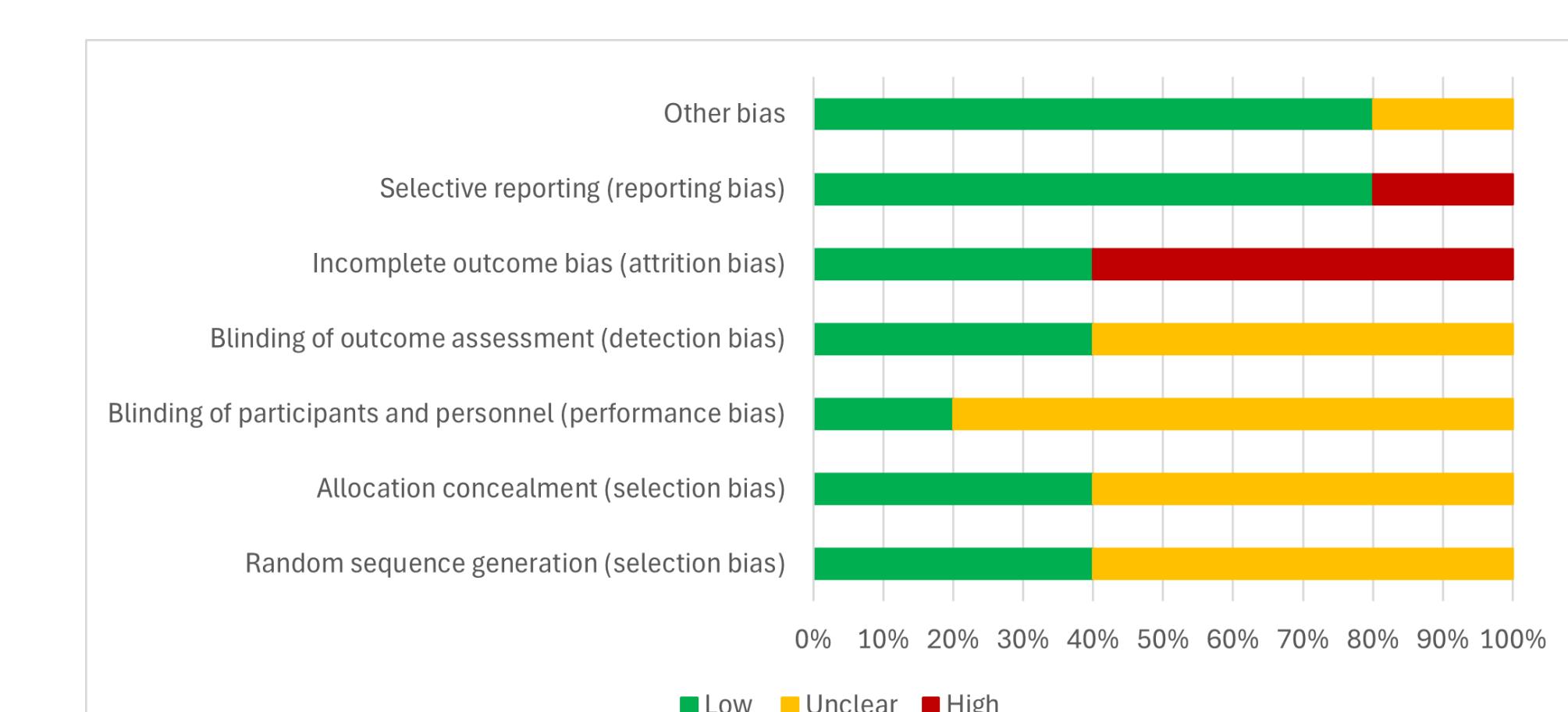


FIGURE 6: Risk assessment in selected studies.

## Conclusion

We found that aerosol, nasal drops, and nebulized INCS were more effective than aqueous INCS for both short-term and long-term treatment of CRSwNP with regard to specific symptoms and nasal histology. Although aqueous INCS were less effective initially, they still provided substantial symptom relief with consistent, long-term use. All INCS delivery methods demonstrated similar safety profiles. This review suggests that patients with CRSwNP who may have contraindications to OCS could benefit from delivery methods that enhance drug deposition, such as nebulizers and nasal drops.

## Reference

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