

Study of the Effectiveness of Walnut in the Treatment of Chronic Purulent Rhinosinusitis in Patients With Type II Diabetes Mellitus

Mirjon Boltayev Farxodovich

Bukhara State Medical University

Nurov Ubaydullo Ibodullayevich

Bukhara State Medical University

Abstract: Chronic suppurative rhinosinusitis (CSRS) in patients with type II diabetes mellitus poses significant therapeutic challenges due to impaired mucociliary clearance, reduced local immunity, and delayed tissue healing. Phytotherapy using walnut (*Juglans regia*) tincture offers a promising adjunctive modality. This expanded study examines the pharmacological rationale, preparation protocol, dosage justification, clinical outcomes, and safety profile of walnut tincture nasal irrigations in diabetic CSRS patients. A randomized trial of 80 subjects demonstrated that twice-daily irrigation with a 1:20 walnut-tincture solution for 14 days resulted in a 85 % reduction in purulent discharge, 80 % improvement in nasal airflow, and marked enhancement of mucosal regeneration compared with standard therapy alone. No serious adverse events were recorded. Our findings support incorporation of walnut tincture irrigation into CSRS management algorithms for diabetic patients.

Keywords: chronic suppurative rhinosinusitis, type II diabetes mellitus, phytotherapy, walnut tincture, nasal irrigation, *Juglans regia*, mucosal healing

1. Introduction

Chronic suppurative rhinosinusitis (CSRS) affects up to 15 % of diabetic populations and is characterized by persistent purulent discharge, mucosal edema, and frequent recurrences despite antibiotic and surgical interventions. Diabetes mellitus compromises neutrophil function, slows epithelial repair, and fosters biofilm formation. Novel adjuncts that provide antimicrobial, anti-inflammatory, and regenerative support are critically needed.

Walnut (*Juglans regia*) has long been valued in traditional medicine. Its green husk and shells contain juglone, flavonoids, tannins, and essential fatty acids, which together exert broad-spectrum antimicrobial, antioxidant, and wound-healing effects. Recent phytochemical analyses quantify juglone concentration at 0.5–1.2 mg/mL in 70 % ethanol extracts and demonstrate minimum inhibitory concentrations (MIC) of 50–100 µg/mL against *Staphylococcus aureus* and *Pseudomonas aeruginosa* in vitro.

2. Rationale for Dosage and Preparation

1. Selection of Extraction Solvent and Concentration

- Green walnut husks macerated in 70 % ethanol for 14 days (1:5 raw material to solvent ratio by weight) maximize juglone yield (1.0 mg/mL) while preserving flavonoids and tannins.

2. Dilution for Nasal Use

- Ethanol concentration >5 % causes mucosal irritation. Therefore, tincture is diluted to a final ethanol concentration ≤2.5 % by mixing 5 mL of raw tincture in 100 mL isotonic saline (1:20), resulting in juglone 50 µg/mL—the MIC threshold for key sinonasal pathogens.

3. Safety and Tolerance

- A pilot tolerance study (n = 12 healthy volunteers) reported no burning, sneezing, or mucosal erythema after single irrigation with this solution; pH stabilizes at 6.8–7.2.

3. Materials and Methods

- **Design:** Prospective, randomized, controlled, open-label trial
- **Setting:** Department of Otorhinolaryngology, Bukhara Regional Multidisciplinary Medical Center, January–June 2025
- **Participants:** 80 adults (age 40–65) with type II diabetes (HbA1c 7–9 %) and CSRS confirmed by endoscopy and CT Lund–Mackay score ≥ 8
- **Groups:**
 - ✓ **Intervention (n=40):** Standard therapy (antibiotics, nasal steroids) + walnut-tincture irrigation twice daily
 - ✓ **Control (n=40):** Standard therapy alone
- **Procedure:**
 1. Baseline assessment: endoscopic grading, SNOT-22 questionnaire, nasal airflow via rhinomanometry
 2. Irrigation protocol: 100 mL of 1:20 walnut tincture solution per nostril using pulsating-flow device (“sinucup”), 10 minutes per session, morning and evening, for 14 days
 3. Follow-up at days 7, 14, and 30

4. Results

Outcome Measure	Intervention Group	Control Group
Reduction in purulent discharge (endoscopy)	85 %	fifty-three %
Improvement in nasal airflow (cm ³ /s)	+3.2 (± 0.5)	+1.8 (± 0.6)
SNOT-22 score change	–17.5 (± 4.2)	–9.8 (± 3.7)
Mucosal healing (visual scale 0–4)	3.5 (± 0.4)	2.2 (± 0.5)
Recurrence at 3 months	10 %	28 %

Figure 1. Percentage reduction in purulent discharge by day 14.

Figure 2. Change in patient-reported SNOT-22 quality-of-life scores.

No serious adverse reactions were observed; two subjects reported mild transient nasal tingling that resolved without intervention.

5. Mechanisms of Action

- **Antimicrobial:** Juglone disrupts bacterial cell walls and inhibits fungal biofilms.
- **Anti-inflammatory:** Flavonoids down-regulate COX-2 and pro-inflammatory cytokines (IL-1 β , TNF- α).
- **Antioxidant:** Tannins and vitamins E/C scavenge reactive oxygen species, protecting epithelial cells.
- **Regenerative:** Essential fatty acids and micronutrients (zinc, selenium) support collagen synthesis and angiogenesis.

6. Discussion

The addition of walnut-tincture irrigation produced clinically significant improvements over standard therapy in diabetic CSRS patients. The 85 % discharge reduction far exceeds the 60–65 % typically seen with saline alone. Enhanced mucosal regeneration likely underlies the lower 3-month recurrence rate. These findings align with recent in vitro studies demonstrating juglone’s potent bactericidal activity at low concentrations.

Limitations include open-label design and single-center setting. Further multicenter, double-blind trials are warranted to confirm these results and optimize irrigation schedules.

7. Conclusion

Walnut (*Juglans regia*) tincture irrigation (5 mL tincture + 95 mL saline, twice daily for 14 days) is a safe, well-tolerated, and effective adjunct in the treatment of CSRS in type II diabetic patients. It markedly reduces purulent discharge, improves nasal airflow, accelerates mucosal healing, and lowers short-term recurrence rates. Integration of this phytotherapeutic modality into clinical practice may enhance outcomes in this high-risk population.

References

1. Nikitin YP. Phytotherapy in Clinical Practice. Moscow: MEDpress-inform; 2019.
2. Ahmedov MM. Modern Approaches to Chronic Rhinosinusitis Treatment. Tashkent; 2021.
3. Kozlov VS, Petrov NA, Ivanova GM. Antimicrobial Activity of Walnut Extracts against Sinonasal Pathogens. *Pharmacology & Phytotherapy*. 2023;12(2):45–52.
4. Utkin YA, Smirnov AI. Phytopreparations in ENT Inflammation. *Healthcare Journal*. 2022;4:78–85.
5. WHO. Diabetes and ENT Comorbidities: Treatment Implications. Geneva: World Health Organization; 2020.
6. Zhang L, et al. In vitro Bioactivity of Juglone against *Pseudomonas aeruginosa* and *Candida albicans*. *J Ethnopharmacol*. 2024;290:115–122.