



# Acupuncture and allergic rhinitis

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## Purpose of review

Allergic rhinitis has a high prevalence and negatively impacts quality of life. Patients commonly use complementary and integrative modalities to help alleviate their symptoms of allergic rhinitis, with approximately one in five receiving acupuncture. This article reviews the evidence base on the efficacy/effectiveness, safety and cost-effectiveness of acupuncture for allergic rhinitis.

## Recent findings

Our review of the medical literature from January 2013 through December 2014 revealed that there is research demonstrating efficacy and effectiveness for acupuncture in the treatment of allergic rhinitis, as well as improvement of quality of life and quality-adjusted life-years.

## Summary

There are high-quality randomized controlled trials that demonstrate efficacy and effectiveness for acupuncture in the treatment of both seasonal and perennial allergic rhinitis. Smaller head-to-head studies also show some preliminary benefit of acupuncture when compared with antihistamines, but these had a variety of methodological limitations. Further studies of higher quality are needed, particularly with a focus on comparative effectiveness research.

## Keywords

acupuncture, allergic rhinitis, complementary and alternative medicine, integrative medicine, randomized controlled trial

## INTRODUCTION

Allergic rhinitis is one of the most common health conditions worldwide. In the United States, allergic rhinitis affects approximately 60 million people and can lead to 3.5 million days of lost work productivity and 2 million days of school absenteeism annually [1,2]. Quality of life can also be significantly impacted with patients experiencing fatigue and impairment of cognitive and learning functions [3]. As a result, there has been a burgeoning demand among patients with allergic rhinitis who seek complementary and integrative therapies [4,5]. In particular, acupuncture is widely used as a therapeutic modality for various otolaryngologic disorders and has been studied through a number of clinical trials [6]. A survey demonstrated that patients with nasal and sinus disorders often have chronic and persistent symptoms that are refractory to conventional medical and surgical treatments and, hence, they commonly utilize various complementary medical therapies, with nearly 20% receiving acupuncture [7]. Another survey revealed that 99% of licensed acupuncturists reported treating patients with chronic sinus and nasal symptoms with a high perceived efficacy of treatment [8].

Krouse [9] has stated that 'it is important that otolaryngologists in both academic and community practices actively participate in the development and evaluation of alternative techniques that impact on disorders of the head and neck ... our specialty must implement an agenda ensuring its primary role in the process of blending complementary therapies with traditional otolaryngological methods.' Accordingly, this article will review the evidence base on the efficacy, effectiveness, cost-effectiveness and safety of acupuncture for allergic

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## KEY POINTS

- There are high-quality RCTs that demonstrate efficacy and effectiveness for acupuncture in the treatment of both seasonal and perennial allergic rhinitis.
- Smaller head-to-head trials have been published comparing acupuncture with antihistamines, all of which favor acupuncture, but these had a variety of methodological limitations.
- Comparative effectiveness research, as prioritized by the Institute of Medicine, is necessary to appropriately and accurately evaluate acupuncture for the treatment of various otolaryngologic disorders, for which there is demonstrated efficacy and effectiveness.
- There is a need for comparative effectiveness research of higher quality and size that compares acupuncture with standard conventional pharmacotherapy, such as antihistamines and topical intranasal corticosteroids.
- For patients with allergic rhinitis who are refractory to conventional pharmacotherapy, head-to-head trials comparing acupuncture with immunotherapy should also be considered.

rhinitis as well as discuss implications for future research.

## BACKGROUND SUMMARY OF EVIDENCE BASE

The use of acupuncture for allergic rhinitis has been evaluated by a few systematic reviews [10–12]. One review concluded that there was insufficient evidence to support or refute its use [11], whereas the most recent systematic review found that there was evidence supporting the effectiveness of acupuncture for perennial allergic rhinitis, although any specific effects of acupuncture for seasonal allergic rhinitis was lacking [12]. Subsequently, a large ( $N=981$ ) pragmatic randomized controlled trial (RCT) was published in 2008 on the use of acupuncture for allergic rhinitis in a real world setting during which patients also received standard routine care [13]. This trial was noteworthy in that all prior studies had much smaller sample sizes (largest  $N=150$ ) and this demonstrated statistically significant improvements in both disease specific (Rhinitis Quality of Life Questionnaire, RQLQ) and general quality of life (Short Form-36) outcome measures after 3 months of acupuncture treatment as compared with a control group that did not receive any acupuncture. Persistent benefit for acupuncture was also found after 6 months (3 months posttreatment). However, this study did not differentiate

between patients with seasonal and perennial allergic rhinitis.

## RECENT RANDOMIZED CONTROLLED TRIALS

A search in the Cochrane database was performed using the keywords, ‘allergic rhinitis’ and ‘acupuncture’ with a separate search in MEDLINE that also included the keywords ‘randomized controlled trial’ or ‘systematic review.’ Dates were confined from January 2013 to December 2014 and there were no language restrictions. Any abstracts that included therapies other than conventional medications or acupuncture, such as moxibustion, auricular acupressure, laser acupuncture, herbal patching and light-emitting diode phototherapy, were excluded. There were a few protocols for RCTs on acupuncture and allergic rhinitis as well as a protocol for a systematic review by Cochrane Ear, Nose and Throat. Five completed RCTs were identified for inclusion in our article, one of which also involved an economic analysis (Table 1).

## EFFICACY AND EFFECTIVENESS

Brinkhaus *et al.* [14<sup>14</sup>] conducted a multicenter RCT, the Acupuncture in Seasonal Allergic Rhinitis trial, that enrolled 422 patients with seasonal allergic rhinitis and immunoglobulin E sensitivity to birch and grass pollen into one of three arms: true acupuncture (TA) with cetirizine as rescue medication (RM), sham acupuncture (SA) along with RM or RM alone. Twelve treatments were given over 8 weeks and the primary outcome measures were changes in RQLQ and Rescue Medication Score from baseline at 8 weeks (posttreatment), 16 weeks and 8 weeks into the second year during pollen season to assess any potential long-term benefit. There was a statistically significant improvement with TA at 8 weeks of 0.5 and 1.1 points on the RQLQ and Rescue Medication Score, respectively, when compared with SA and improvements of 0.7 and 1.5 points when compared with RM alone. However, there was no significant difference between groups at 16 weeks, although there was a small improvement in favor of TA over SA at the 8-week follow-up of the second year.

A recent multicenter RCT by Choi *et al.* [15<sup>15</sup>] evaluated 238 patients with perennial allergic rhinitis and compared true acupuncture with sham acupuncture and a no-acupuncture waitlist group. Twelve treatments were administered over a 4-week period with changes from baseline at 4 weeks (post-treatment) and 8 weeks in the Total Nasal Symptom Score as the primary outcome. True acupuncture had a statistically significant improvement of 1.03

**Table 1.** Summary of randomized controlled trials on acupuncture for allergic rhinitis [14<sup>\*\*\*</sup>,15<sup>\*</sup>,16–19]

Authors	Condition/number of patients	Interventions	Primary (secondary) outcomes	Main results
Brinkhaus <i>et al.</i> 2013 [14 <sup>***</sup> ]	Seasonal allergic rhinitis (N=422)	TA (12 treatments over 8 weeks) + RM (cetirizine) vs. SA + RM vs. RM alone	Changes in RQLQ and RMS (VAS, SF-36) from baseline at 8 weeks (posttreatment), 16 weeks and 8 weeks in second year	TA had statistically significant improvements of 0.7 and 1.5 points compared to RM alone and 0.5 and 1.1 points compared with SA
Choi <i>et al.</i> 2013 [15 <sup>*</sup> ]	Perennial allergic rhinitis (N=238)	TA vs. SA vs. waitlist; 12 treatments over 4 weeks	Changes in TNSS (TNNSS, RQLQ) from baseline at 4 weeks (posttreatment) and 8 weeks	TA had statistically significant improvements of 1.03 and 1.09 points compared with SA and 2.49 points compared with waitlist
Hauswald <i>et al.</i> 2014 [16]	Perennial allergic rhinitis (N=24)	TA (12 treatments over 6 weeks) vs. loratadine 10 mg daily × 21 days	Changes in subjective symptoms on 5 point scale (anterior rhinoscopy, total and specific IgE levels, IL-10, IL-4 and IFN-γ levels) from baseline at 6 weeks (posttreatment) and 16 weeks	TA had 87% improvement at 6 weeks (posttreatment) and 80% at 16 weeks; loratadine had 67% improvement at 6 weeks (posttreatment) and 0% at 16 weeks
Wang <i>et al.</i> 2013 [17]	Perennial allergic rhinitis (N=81)	TA (12 treatments over 4 weeks) vs. loratadine tablet and azelastine hydrochloride nasal spray daily × 12 days	Changes in subjective symptoms from baseline at 2 weeks (posttreatment)	TA had 95% improvement, whereas medication group had 83% improvement post-treatment
Ou <i>et al.</i> 2014 [18]	Allergic rhinitis (N=66)	TA daily vs. desloratadine 5 mg daily × 20 days	Changes in subjective symptoms from baseline at 3 weeks (posttreatment)	TA had 94% improvement, whereas desloratadine had 73% improvement at 3 weeks (posttreatment)
Reinhold <i>et al.</i> 2013 [19] (Economic analysis of Brinkhaus <i>et al.</i> 2013 [14 <sup>***</sup> ] RCT)	Seasonal allergic rhinitis (N=384)	TA + RM vs. SA + RM vs. RM alone (12 treatments over 8 weeks)	SF-36, QALYs, ICER	TA has significantly higher QALYs compared with RM alone, but has higher cost

ICER, incremental cost-effectiveness ratio; IFN-γ, interferon gamma; IgE, immunoglobulin E; IL-4, interleukin-4; IL-10, interleukin-10; QALYs, quality-adjusted life-years; RM, rescue medication; RMS, Rescue Medication Score; RQLQ, Rhinitis Quality of Life Questionnaire; SA, sham acupuncture; SF-36, Short Form 36; TA, true acupuncture (according to Traditional Chinese Medicine theory); TNNSS, Total Nonnasal Symptom Score; TNSS, Total Nasal Symptom Score; VAS, Visual Analog Scale.

and 1.09 points at 4 and 8 weeks, respectively, compared with sham acupuncture and an improvement of 2.49 points at 4 weeks compared with the no-acupuncture waitlist group.

A smaller RCT by Hauswald *et al.* [16] included 24 patients with perennial allergic rhinitis and compared 12 treatments of true acupuncture over a 6-week period with loratadine 10 mg daily for 21 days. True acupuncture had an improvement of 87% at 6 weeks (posttreatment) and 80% at 16 weeks, whereas loratadine had an improvement of 67 and 0%. This trial, however, had several methodological issues including a small sample size and a paucity of raw data that was reported. Though this RCT was small, it was novel in that it was the only trial published in the English language that had a

head-to-head comparison between acupuncture and daily conventional medication, whereas most other trials used medication only as rescue treatment.

Other head-to-head trials have been completed in China, including an RCT by Wang *et al.* [17] which enrolled 81 patients with perennial allergic rhinitis and compared 12 treatments of acupuncture administered over 4 weeks with daily loratadine tablet and azelastine hydrochloride nasal spray given over 12 days. There was 95% improvement with acupuncture compared with 83% improvement with medication, as found on changes in subjective symptoms posttreatment. However, this RCT also had several methodological limitations. It was unclear whether a standard validated outcome measure was used. Another RCT from China was

conducted by Ou *et al.* [18] and included 66 patients, though the type of allergic rhinitis was not differentiated. Patients were given daily treatments of acupuncture vs. desloratadine 5 mg daily for 20 days. The authors found that patients who received acupuncture had 94% improvement post-treatment, whereas those who were treated with desloratadine had 73% improvement.

## COST-EFFECTIVENESS

Reinhold *et al.* [19] evaluated the cost-effectiveness of acupuncture by measuring the incremental cost-effectiveness ratio on a total of 364 patients from the 422 who were initially randomized from the Acupuncture in Seasonal Allergic Rhinitis trial conducted by Brinkhaus *et al.* Patients were divided into three cohorts: TA + RM, SA + RM and RM alone. Twelve treatments were given over 8 weeks and the primary outcome measures were group differences in cost from the societal and third-party payer perspectives and quality-adjusted life-years from baseline to 8 weeks (posttreatment) and 8 to 16 weeks. From baseline to 8 weeks, there was a higher accrued cost and incremental cost-effectiveness ratio with the TA and SA groups, suggesting that acupuncture may not be cost-effective; however, there was a statistically significant improvement with TA in quality-adjusted life-years when compared with RM alone ( $P=0.001$ ). Analysis of a longer time horizon to 16 weeks demonstrated improved cost-effectiveness for acupuncture, which was more consistent with a prior RCT conducted by the same authors that examined 981 patients and concluded that acupuncture was cost-effective for the treatment of allergic rhinitis [20]. Given the mixed results, further studies are needed to evaluate whether acupuncture is a cost-effective therapy for allergic rhinitis.

## SAFETY

Acupuncture involves the use of sterile, disposable single-use needles that are made of solid stainless steel with diameters usually between 32 and 40 gauge. A review of the literature demonstrates that adverse events generally occur rarely and are typically mild in nature, especially when treatment is administered by well trained and experienced clinicians.

A prospective survey collected from June 1998 to February 2000 in the United Kingdom from 78 acupuncturists (all doctors or physiotherapists) examined 31 822 visits. Forty-three 'significant' events were reported (14 per 100 000). All adverse events resolved within a week except for an incident

of pain lasting 2 weeks and paresthesia lasting several weeks [21]. Similar studies demonstrated 13 per 100 000 performed by Traditional Chinese Medicine trained acupuncturists [22] and 14 per 100 000 treatments in Japanese acupuncture [23], in which no serious adverse events (e.g., nerve or organ injuries) were reported. A large prospective survey among 97 733 acupuncture patients found 7.1% minor adverse events (e.g., bleeding at the needle insertion site, bruising and drowsiness after treatment), in which the authors concluded that serious adverse events are rare and that acupuncture is generally a well tolerated intervention [24]. In a recent prospective observational study performed at an out-patient training clinic in Brazil, 13 884 acupuncture treatments were evaluated for adverse events over a period of 28 months [25]. There were 1157 patients who received acupuncture for various health conditions, most of which were musculoskeletal complaints. The rate of minor adverse events per consultation was 7.97%, wherein patients complained of bleeding at the insertion site after needle removal (4.1%), pain at the needle site (3%) and erythema/pruritus at the insertion point (0.43%). Another recent study in Korea evaluated 4891 acupuncture treatments administered to 242 patients over a 2-year period who were divided into three groups, those who were on warfarin, on antiplatelet medications but not warfarin and not on any anti-coagulants, which acted as a control group [26]. The occurrence rate for microbleeding (wherein the bleeding stopped within 30 s of needle removal) was 4.8% for the first group, 0.9% for the second group and 3.0% for the group not on any anti-coagulants. The authors' conclusion was that 'acupuncture treatment appears well tolerated even for patients taking warfarin or antiplatelet medications.'

## EFFICACY, EFFECTIVENESS AND COMPARATIVE EFFECTIVENESS RESEARCH

There are salient differences between trials of efficacy (treatment comparing acupuncture with placebo under ideal conditions) vs. effectiveness (pragmatic studies investigating the practice of acupuncture in a real world setting) [27]. Although both have their merits, it may be time to prioritize future studies that focus on comparative effectiveness research [28]. Notably, complementary and alternative medicine and disorders of the ears, nose and throat were both identified as primary areas for comparative effectiveness research by the Institute of Medicine [29]. An emphasis on comparative effectiveness research would be consistent with the new

model of research advocated by Krouse [9] to appropriately and accurately evaluate complementary and integrative medicine therapies for otolaryngologic disorders.

## CONCLUSION

There are high-quality RCTs that demonstrate efficacy and effectiveness for acupuncture in the treatment of both seasonal and perennial allergic rhinitis. Smaller head-to-head trials have been published comparing acupuncture with antihistamines, all of which favor acupuncture, but these had a variety of methodological limitations including small sample sizes, paucity of raw data reported and lack of a standard validated outcome measure in many cases. Hence, there is a need for comparative effectiveness research of higher quality and size. Studies comparing acupuncture directly with topical intranasal corticosteroids are also important, as these are commonly used as treatment for allergic rhinitis. For patients with allergic rhinitis who are refractory to pharmacotherapy, head-to-head trials comparing acupuncture with immunotherapy should also be considered. There is some preliminary evidence demonstrating potential benefit of acupuncture for other nasal and sinus disorders that are chronic and recalcitrant [30].

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## Conflicts of interest

There are no conflicts of interest.

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Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

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