The Laryngoscope

Clinical Effect Analysis of Fire-needle Acupuncture at Neiyingxiang Treating Persistent Allergic Rhinitis

Jianwei Ai, MD; Suying Guo, MD; Yaqin Wang, MD; Yuezhi Kang, MD; Man Wang, MD; Jingyi Zhao, MD; Shaoting Huang, MD; Junge Wang, MD, PhD

Objectives: We conducted the first trial to evaluate the effect that fire-needle acupuncture at Neiyingxiang (ExHN 9) in patients with moderate to severe persistent AR.

Methods: This was a randomized, single-center, sham, and placebo-controlled rial. Patients were kept blinded to their group assignment. All participants were equally assigned to the fire-needle acupuncture (FA) treatment group, sham fire-needle acupuncture (SFA) group, or loratadine group. The trial was designed with an acupuncture intervention once a week for 4 weeks and follow-up 4 weeks. The Total Nasal Symptom Scores (TNSS), Total Non-Nasal Symptom Scores (TNNSS), Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ), Allergic Rhinitis Control Test (ARCT), and total nasal resistance of 150 Pa were evaluated as outcome measures.

Results: A total of 180 participants were enrolled, and 175 participants completed the trials. At 2 and 4 weeks, the TNSS, TNNSS, and RQLQ scores of the FA and loratadine groups were significantly lower than those of the SFA group. At 8 weeks, the scores of loratadine group increased compared with the FA group (Cohen's d >0.80, p < 0.01). The ACRT score of the FA treatment group rose gradually. After treatment, the total nasal resistance of the FA group was significantly decreased and was lower than that of the other two groups (Cohen's d >0.80, p < 0.01).

Conclusion: Fire-needle acupuncture at Neiyingxiang (ExHN 9) is effective for improving nasal allergy symptoms and quality of life in patients with moderate and severe persistent AR, and the duration of its effects is long.

Key Words: acupuncture, allergic rhinitis, fire needle, neiyingxiang (ExHN 9).

Level of Evidence: 2

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INTRODUCTION

Allergic rhinitis is a noninfectious chronic inflammatory disease that develops due to allergen exposure and results in IgE-mediated inflammation of the nasal membranes, which mainly manifests as nasal pruritus, rhinorrhea, nasal congestion, and sneezing. As one of the most common chronic diseases, it affects 5%–50% of people worldwide, and its incidence is increasing.[1] Allergic rhinitis seriously affects people's quality of life; it affects sleep, work efficiency, and children's memory, and it causes inconvenience in social settings. In addition, allergic rhinitis can also make patients feel irritable and may lead to anxiety, depression, and other psychological disorders, greatly increasing the burden on society and family. Currently, the treatment of allergic rhinitis is focused on symptom relief. Treatment mainly involves avoiding exposure to allergens, as well as pharmacological treatments such as mast cell stabilizers, chemical mediator receptor antagonists (including antihistamines, antileukotrienes, and prostaglandin D2 receptor antagonists), Th2 factor inhibitors, oral or nasal spray hormones, nasal vasoconstrictors, and immunotherapy.[2] However, these treatments do not always provide complete symptom relief. Around one-third of patients with moderate/severe symptoms are uncontrolled despite optimal pharmacologic treatment.[3] Undesirable side effects, such as somnolence, are often associated with these drugs.[4] An increasing number of complementary and alternative treatments, such as Chinese herbal medicine and acupuncture, have received increasing attention from scholars and often can have beneficial effects. According to statistics, more than 42% of Americans have received complementary and alternative therapies for allergic rhinitis, and in some European countries, this percentage is even higher.[4]

Traditional Chinese Medicine (TCM) acupuncture treatment for allergic rhinitis has a long history spanning thousands of years. It has the advantages of simplicity, convenience, inexpensiveness, and efficacy; additionally, it can prevent disease onset and relapse. It has been

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frequently listed in the guidelines for allergic rhinitis worldwide and is widely accepted by patients.[1,5,6] The fire-needle acupuncture (FA) combined with acupuncture and moxibustion, it is a method of pricking a burning red needle tip into the acupoint quickly to treat disease.[7] The thermal reaction can directly act on the deep acupoint, has the effect of warming the channels, dispersing cold, tonify Yang-qi, and dredge meridians.[8] Therefore, we used FA to warm meridians and disperse cold to treat AR. However, the quality of relevant studies is not high, and there is not enough evidence to demonstrate the effectiveness of fire needles in the treatment of allergic rhinitis. Most scholars choose acupuncture points on the skin, which easily causes local skin burns and scars.[9] So, many patients are unwilling to undergo this type of treatment. Moreover, no scholar have selected FA upon the point location at nasal mucosa for treatment AR yet. Through preliminary clinical observation, we found that fire-needle acupuncture at Neiyingxiang (ExHN 9) can rapidly relieve patients of nasal symptoms caused by perennial allergic rhinitis.[10] Therefore, we designed a randomized controlled trial (RCT) to compare the effects of FA and loratadine treatment on persistent AR. This study is the first randomized trial to evaluate the efficacy of FA pricking ExHN 9 for the treatment of persistent AR.

METHODS

Study Design

This was a randomized, single-center, sham, and placebo-controlled rial. Patients were kept blinded to their group assignment. This clinical trial was approved by the Ethics Committee of the Beijing Hospital of Traditional Chinese Medicine and registered in the Chinese Clinical Trial Registry (ChiCTR2200060656).

A total of 175 patients with moderate to severe persistent AR who were admitted to Beijing Hospital of Traditional Chinese Medicine from July 2022 to May 2023 were included in this study. All participants were briefed on the purpose, procedures, treatments, and possible risks of the trial. All patients clearly understood their rights to discontinue participation at any point. All participants signed consent forms.

Diagnostic Criteria

Patients were diagnosed with moderate to severe persistent AR according to the Allergic Rhinitis and Its Impact on Asthma (ARIA) guidelines:[11] (1) rhinorrhea, nasal obstruction, nasal itching, and sneezing; (2) SPT showed a wheal size 3 millimeters greater than that of the negative control and/or serum sIgE antibody positivity to clinically relevant aeroallergens (house dust mites, molds, and animal danders); (3) symptoms present ≥4 days/week and for more than 4 consecutive weeks; (4) the symptoms severely impact the quality of the patient's life; and (5) Lung qi deficiency and cold syndrome according to the Chinese medicine syndrome differential diagnosis.[12]

Inclusion Criteria

Patients were included if they met the following criteria: (1) met the diagnostic criteria of Lung qi deficiency and cold syndrome type moderate to severe persistent AR; (2) more than 1 year onset of symptoms; (3) were aged between 18 and 65 years old; and (4) were fully informed, signed consent, and agreed to participate in the clinical trial.

Exclusion Criteria

Exclusion criteria included: (1) over 65 years of age or less than 18 years old; (2) patients with sinusitis, upper respiratory tract infection, or asthma; (3) patients with known or suspected loratadine allergy or contraindications; (4) antihistamines, oral or nasal glucocorticoids, decongestants, mast cell membrane stabilizers, leukotriene antagonists, etc., were used within the last 14 days; (5) patients who received specific immunotherapy or systemic hormone therapy within the last year; (6) due to allergic rhinitis, patients received acupuncture, moxibustion, massage, or oral Chinese medicine and other traditional medicine therapy or external treatment in the past 1 month; (7) complications, including tumours, serious disease of the heart, liver, kidney, or other important organs, blood or endocrine diseases; (8) planned pregnancy, pregnancy, or lactation in the past 6 months; and (9) those who did not sign the informed consent.

Patients and Randomization

Patients were randomly divided into the FA treatment group, SFA control group, and Loratadine control group at a ratio of 1:1:1 by a random number table method of a computer program (Excel, Microsoft, USA). Because acupuncture or sham acupuncture was needed, the acupuncturists were not blinded during the study. Participants and statisticians were blinded. Blind exposure was not provided until the statistical analysis was complete. To ensure that the blind was maintained, we used a placebo oral medication and a placebo needle method, so that each group of patients received acupuncture and an oral medication.

Interventions

FA treatment group (FA with placebo): The patient in FA treatment group received acupuncture using a fire needle (heshi fire needle, medium and thick type, diameter 0.8 mm). The front end of the haemostatic forceps clamped the alcohol cotton ball, ignited the alcohol cotton ball, burned the front end of the fire needle to the red with the alcohol external flame, and quickly pricked the Neiyingxiang (ExHN 9) point (Fig. 1). The acupoints were selected and localized according to the WHO Standardized Acupuncture Point Location guidelines. The points were located in the lateral wall of the nasal cavity, the frontal attachment of inferior turbinate (Fig. 2). The acupuncturist oblique insertion the points toward the attachment of the middle turbinate at a depth of 0.3–0.5 cm, with no needle retention. If bleeding occurred in the nasal cavity after the needle, the bilateral alar was held for 5 min to stop the bleeding. At the same time, patients were administered oral placebo at a dose of 10 mg qd.

Two control groups were used in the study:

SFA control group: a fire needle was heated and then cooled before lightly pricking at Neiyingxiang (ExHN 9) of the inferior turbinate mucosa at a depth of <0.1 cm; no bleeding occurred. An oral placebo was administered at the same dose as in the experimental group.

Loratadine control group: treated with sham fire needle combined with loratadine tablets. The dosage was 10 mg qd.

The frequency of needle application in the three groups was once a week for 4 weeks, and oral placebo tablets or loratadine tablets 10 mg qd were taken orally for 4 weeks.

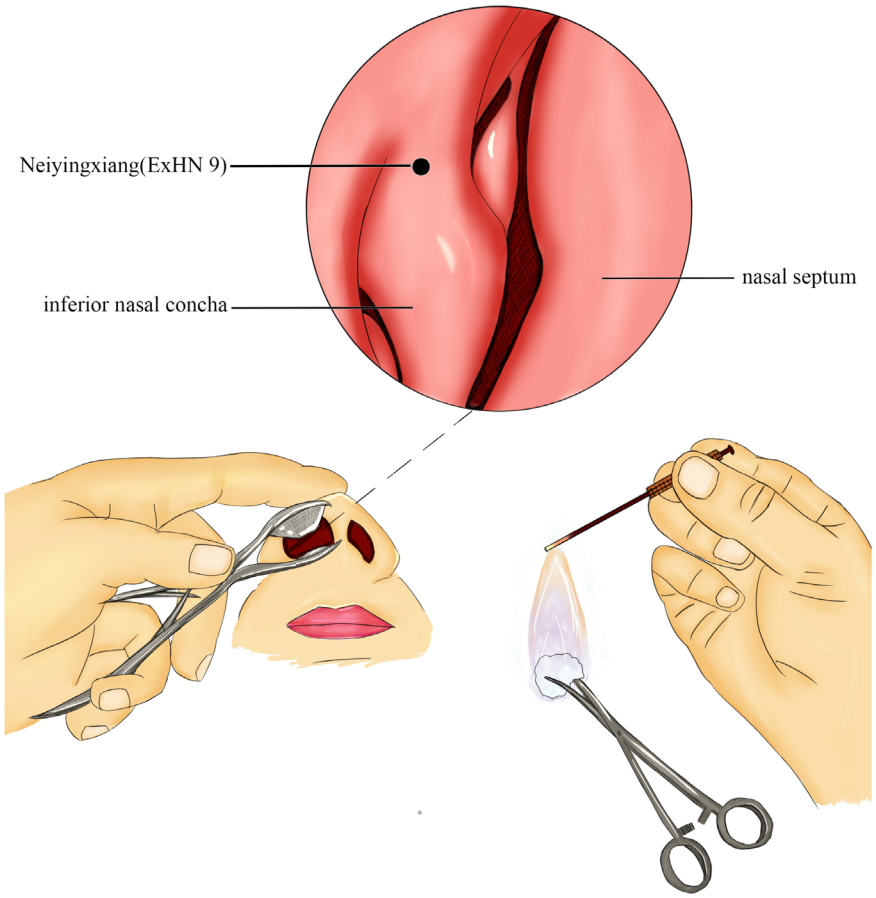

Fig. 1. Schematic diagram of intranasal acupuncture at Neiyingxiang (ExHN 9) point. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

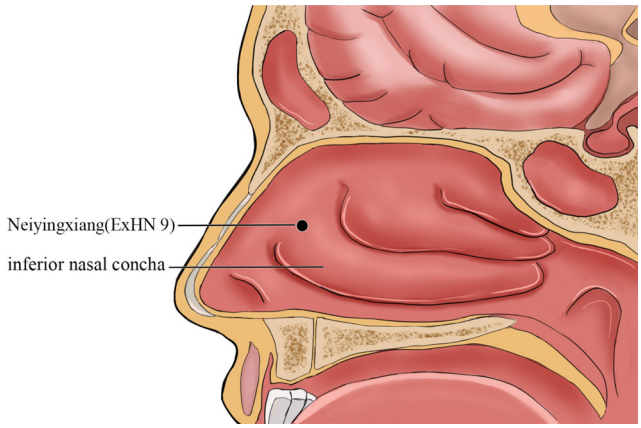

Fig. 2. Sagittal plane of Neiyingxiang (ExHN 9) point. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

Blinding

This was a single-blind trial. Each subject received fire-needles or sham fire-needles and oral medication or placebo. The subjects were blinded to their grouping, and each subject was treated in a separate room to avoid communication. The acupuncture treatment of the treatment group and the control group was carried out by the same doctor, and the acupuncturist was not blinded to the patient group.

Assessment

We evaluated TNSS, TNNSS, RQLQ, and Total Nasal Resistance in baseline and 2, 4, a 8 weeks after treatment. ARCT was evaluated at 2, 4, 8 weeks after treatment. The TNSS was used to evaluate the severity of nasal congestion, rhinorrhea, nasal pruritus and sneezing in AR patients. The TNNSS is an evaluation of additional symptoms of persistent allergic rhinitis that are not included in the TNSS score, such as nasal discharge from the pharynx, tears, nasal or eye itching, nasal or oral maxillary pain, headache and other symptoms. The RQLQ reflects the change in quality of life in patients with rhinitis. It includes 28 items and seven domains for which patients rate each question on a 7-point scale (0 = no impairment to 6 = maximum impairment). ARCT evaluates the impact of rhinitis symptoms on life, and it is self-assessed by patients with rhinitis following treatment. The bilateral total nasal resistance was measured at a nasal pressure of 150 Pa. The pressure catheter of the nasal adaptor was placed in the nostril on the side that was not being measured to ensure there was no air leakage. The patient was instructed to continue normal breathing through their nose. Data were collected for stable curves, and a computer program automatically collected the measurements four times for analysis.

Statistical Analysis

The sample size was calculated based on the TNSS in 2 weeks and taken as the main evaluation index based on the data from our pilot study through PASS, version 2021 (NCSS, Kaysville, UT). In

our pilot trial, the mean and the standard deviation in FA group was 4.72 and 1.81, in SFA group 6.70 and 1.92, in loratadine group was 4.32 and 1.73. A sample size of 48 was needed in each group ($\alpha = 0.05$, 90% power). Allowing for a possible dropout rate of 20%, we finally recruited 180 (60 in each group) participants.

All statistical analysis was performed using SPSS version 25 (SPSS Inc, Chicago, USA). The results were presented as mean ± SD or the number of amount, according to the type of variables. The chi-square test was used for categorical variables. Two-factor repeated measures ANOVAs (group × time) were used to identify a treatment effect over time, considering the relationship between evaluations performed on the same individual. If the interaction effect was significant ($p < 0.05$), we applied Student's t-tests for comparing values at the same time points between groups. Cohen's d effect sizes were calculated for these comparisons. A d value of 0.20 is described as small, 0.50 as moderate, and 0.80 as large. A two-sided p value <0.05 was considered statistically significant.

RESULTS

Study Participants and Baseline Characteristics

A total of 180 patients were recruited in this trial, and 175 patients completed the trial (57 in the fire-needle treatment group), 58 in the sham fire-needle control group, and 60 in the loratadine control group. Five patients did not complete treatment due to fear of acupuncture, and no adverse events occurred in any of the patients (Fig. 3). There was no significant difference in the baseline characteristics among the three groups (Table I). Almost all patients experience pain when the needle is inserted, although the intensity of the pain is generally acceptable and typically subsides within 1 min. The vast majority of the patients experienced bleeding after acupuncture, which stopped within 5 min after applying pressure to both ala nasi toward the septum.

Outcome Measures

Mean scores ± SD at baseline, 2, 4, and 8 weeks for TNSS, TNNSS, RQLQ, ACRT, and Total Nasal Resistance were shown in Table II. Repeated measurement ANOVA showed significant interaction effects in the TNSS, TNNSS, RQLQ, ACRT, and Total Nasal Resistance scores across three groups ($p < 0.05$).

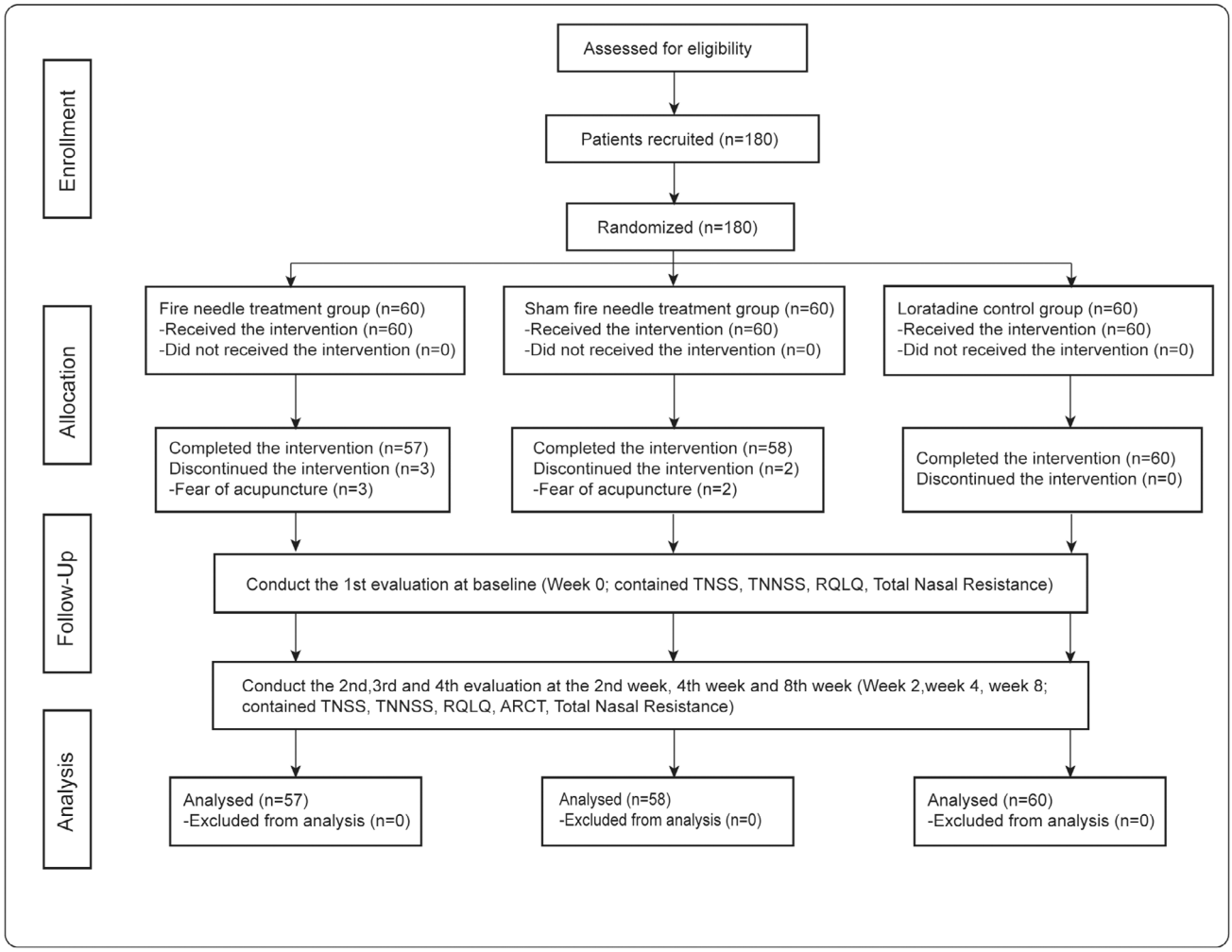

Fig. 3. Flow diagram of participant screening and randomization.

TABLE I.
Comparison of Clinical Features of Patients Among Three Groups.

Characteristics	FA Group ($n = 57$)	SFA Group ($n = 58$)	Loratadine Group ($n = 60$)	p value
Age(years)*	35.93 ± 9.28	37.61 ± 10.32	34.32 ± 8.95	0.18
Gender(male/female)†	22/35	21/37	23/37	0.96
BMI(Kg/m^2)*	23.32 ± 6.32	24.56 ± 7.28	22.87 ± 6.88	0.39
Scales initial scores				
TNSS score*	7.52 ± 1.93	7.45 ± 1.91	7.47 ± 1.86	0.98
TNNSS score*	2.79 ± 0.93	2.82 ± 0.85	2.66 ± 0.95	0.60
RQLQ score*	82.57 ± 18.64	80.21 ± 17.55	82.58 ± 18.45	0.72
Initial total nasal resistance ($\bar{x} \pm s$, kPa/(cm^3·s))*	0.25 ± 0.07	0.27 ± 0.07	0.26 ± 0.08	0.35

For each variable except gender and severity of initial symptom, the values are expressed as the means ± SD.
BMI = body mass index; RQLQ = rhinoconjunctivitis quality of life questionnaire; TNNSS = total non-nasal symptom scores; TNSS = total nasal symptom scores.
*Analysis of variance test.
†Chi-square test.

TABLE II.
Scores of All Time Points for TNSS, TNNSS, RQLQ, ACRT, and Total Nasal Resistance (Mean ± SD).

		FA Group ($N = 57$)	SFA Group ($N = 58$)	Loratadine Group ($N = 60$)	Statistical Analysis (FA VS SFA)		Statistical Analysis (FA VS Loratadine)		Statistical Analysis (Loratadine VS SFA)	
		Mean ± SD	Mean ± SD	Mean ± SD	Cohen's d	p value	Cohen's d	p value	Cohen's d	p value
TNSS	Baseline	7.52 ± 1.93	7.45 ± 1.91	7.47 ± 1.86	0.04	0.845	0.04	0.887	0.01	0.954
	2 weeks	4.93 ± 1.60	6.68 ± 1.72	4.35 ± 1.38	1.05	<0.001	0.39	0.038	1.49	<0.001
	4 weeks	4.38 ± 1.61	5.32 ± 1.52	4.02 ± 1.31	0.60	0.002	0.25	0.186	0.92	<0.001
	8 weeks	3.94 ± 1.34	5.26 ± 1.14	5.19 ± 1.53	1.06	<0.001	0.87	<0.001	0.05	0.779
TNNSS	Baseline	2.79 ± 0.93	2.82 ± 0.85	2.66 ± 0.95	0.03	0.857	0.14	0.456	0.18	0.338
	2 weeks	2.10 ± 1.02	2.56 ± 0.91	1.42 ± 0.55	0.48	0.012	0.83	<0.001	1.52	<0.001
	4 weeks	1.95 ± 0.87	2.31 ± 0.92	1.51 ± 0.64	0.40	0.033	0.58	0.002	1.01	<0.001
	8 weeks	1.71 ± 0.68	2.17 ± 0.92	2.30 ± 1.02	0.57	0.003	1.01	<0.001	0.13	0.469
RQLQ	Baseline	82.57 ± 18.64	80.21 ± 17.55	82.58 ± 18.45	0.13	0.486	<0.01	0.998	0.13	0.476
	2 weeks	67.00 ± 15.23	77.45 ± 16.99	63.23 ± 16.18	0.65	<0.001	0.24	0.198	0.86	<0.001
	4 weeks	52.63 ± 12.55	65.12 ± 17.67	58.32 ± 12.88	0.81	<0.001	0.45	0.017	0.44	0.018
	8 weeks	42.57 ± 10.23	72.35 ± 16.68	70.19 ± 15.64	2.15	<0.001	2.09	<0.001	0.13	0.469
ACRT	2 weeks	15.02 ± 3.27	8.45 ± 2.55	17.23 ± 3.96	2.24	<0.001	0.61	0.001	2.64	<0.001
	4 weeks	17.80 ± 3.28	10.19 ± 2.97	18.56 ± 4.21	2.43	<0.001	0.20	0.280	2.30	<0.001
	8 weeks	18.47 ± 3.19	8.92 ± 2.68	10.11 ± 2.92	3.24	<0.001	2.73	<0.001	0.42	0.023
Total Nasal Resistance	Baseline	0.25 ± 0.07	0.27 ± 0.07	0.26 ± 0.08	0.29	0.128	0.13	0.474	0.13	0.472
	2 weeks	0.20 ± 0.05	0.24 ± 0.06	0.23 ± 0.05	0.72	<0.001	0.60	0.002	0.18	0.327
	4 weeks	0.17 ± 0.05	0.21 ± 0.05	0.20 ± 0.06	0.8	<0.001	0.54	0.004	0.18	0.328
	8 weeks	0.16 ± 0.05	0.23 ± 0.05	0.23 ± 0.06	1.4	<0.001	1.27	<0.001	0	1

ACRT, allergic rhinitis control test; RQLQ, rhinoconjunctivitis quality of life questionnaire; TNNSS, total non-nasal symptom scores; TNSS, total nasal symptom scores.

Outcome

At 2 weeks and 4 weeks, the total TNSS scores in the three groups decreased compared with the score at baseline. The TNSS scores of the FA group and the loratadine group were significantly lower than those of the SFA group ($p < 0.01$). At 8 weeks, the score of the loratadine group increased and was significantly higher than that of the FA group ($p < 0.001$, Fig. 4).

At 2 weeks and 4 weeks, the TNNSS scores of the loratadine group were significantly lower than those of the other two groups ($p < 0.01$). At 8 weeks, the scores of the loratadine group were higher than those of the fire-needle treatment group ($p < 0.001$).

At 2 and 4 weeks, the RQLQ scores of the FA group and loratadine group were significantly lower than those of the SFA group ($p < 0.05$). At 8 weeks, the RQLQ scores

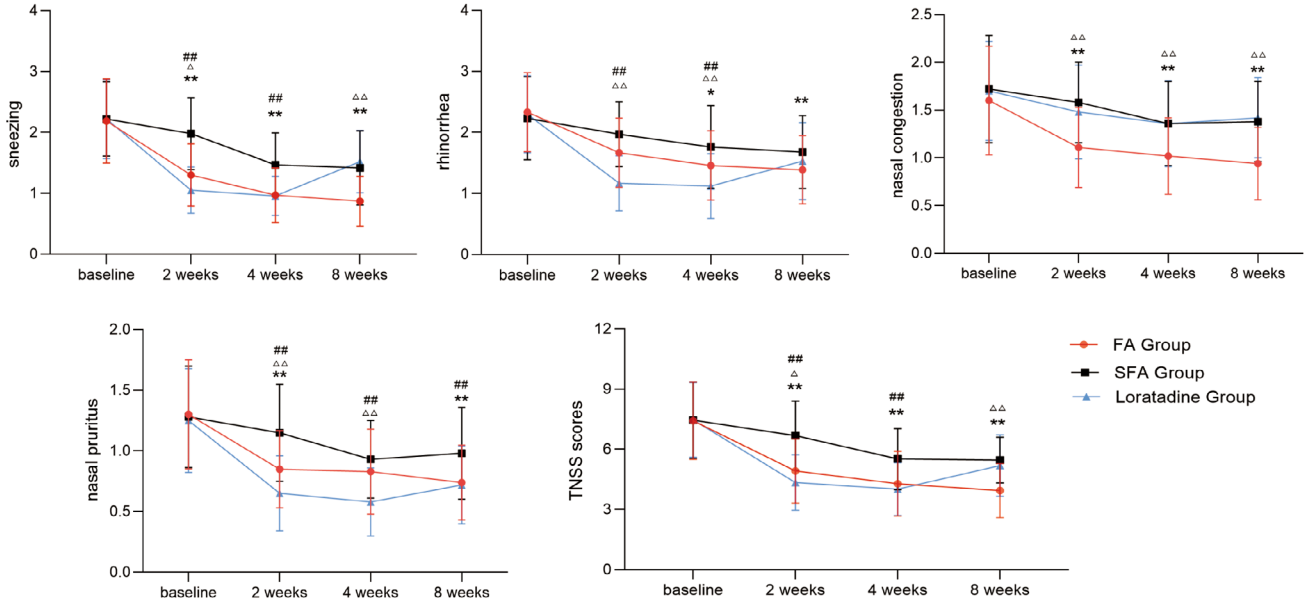

Fig. 4. Comparison of TNSS scores and subitems in patients with moderate–severe persist ar among the three groups ($\bar{x} \pm s$). $^{*}p < 0.05$, $^{**}p < 0.01$ FA group vs. SFA group at the same time point; $^{\triangle}p < 0.05$, $^{\triangle\triangle}p < 0.01$ FA group vs. Loratadine group at the same time point; $^{\#}p < 0.05$, $^{\#\#}p < 0.01$ Loratadine group vs. SFA group at the same time point. TNSS: Total nasal symptom score. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

of the loratadine group were higher than those of the FA group ($p < 0.001$).

At 2 and 4 weeks, the ARCT scores of the FA group and the loratadine group were higher than those of the SFA group ($p < 0.001$). The ACRT score of the FA group gradually increased. In addition, at 4 weeks, the ACRT scores of the loratadine group was higher than it was at 2 weeks and decreased at 8 weeks (Fig. 5).

At 2, 4, and 8 weeks, the total nasal resistance of the FA group decreased significantly. The total nasal resistance of the FA group was lower than that of the SFA group and the loratadine group ($p < 0.01$). There was no significant difference between the loratadine group and the SFA group (Fig. 6).

DISCUSSION

In this study, we found that fire-needle acupuncture at the Neiyingxiang (ExHN 9) point can significantly improve the nasal symptoms of patients with moderate to severe perennial allergic rhinitis, improve the quality of life, significantly reduce the TNSS, TNNSS, and RQLQ scores and nasal airway resistance, and improve ACRT scores. Compared with loratadine alone, the nasal congestion relief effect of fire-needle acupuncture is better, with a longer duration and lower likelihood of relapse.

The effectiveness and scientificity of acupuncture and moxibustion in the treatment of allergic rhinitis have been confirmed by several studies.[13,14] Some scholars have found that acupuncture regulates the immune system and has antihistamine-like effects, which can significantly reduce the need for antihistamines in patients.[15] The use of fire needles was first recorded in *Huangdi Neijing*. In this acupuncture method, certain acupoints or parts of the human body are penetrated by a needle which is heated until it is red-hot to eliminate diseases. As a specialized form of acupuncture, fire-needle acupuncture is thought to dredge the meridian, dissipate cold through heat, and enhance the circulation of blood and qi.[16] This method is widely used in the treatment of bone and joint diseases, nervous system diseases, skin diseases, digestive system diseases, and respiratory system diseases.[17] In addition, fire needles also have the effect of immune mediation; they can reduce abnormally increased serum IgE levels, reduce the sensitivity of the body to allergies, and inhibit the release of allergic mediators.[18–20] There have been many clinical reports on the treatment of allergic diseases with fire-needle therapy, involving dermatology, rheumatology, immunology, oncology, and neurology.[21] In traditional Chinese medicine theory, AR is attributed to a specific constitutional state, visceral depletion, and exogenous pathogenic factors. The most common type of persistent AR is associated with lung qi deficiency and cold syndrome. Clinical manifestations include an itchy nose, sneezing, clear and watery nasal discharge, nasal congestion, and a tendency for symptoms to recur after exposure to sudden climate changes or cold weather. The tongue typically appears light pink and swollen with a thin white coating, and the pulse is weak and pale.[22,12] In the past, many scholars have treated allergic rhinitis with fire needles and achieved good therapeutic effects.[23–26] But there is no consensus among scholars regarding fire-needle acupuncture points in the nasal mucosa which should be pricked for treatment. Additionally, fire needles easily cause local skin burns and scars, so many patients are unwilling to undergo this type of treatment. Therefore, we used the method of fire-needle acupuncture at Neiyingxiang

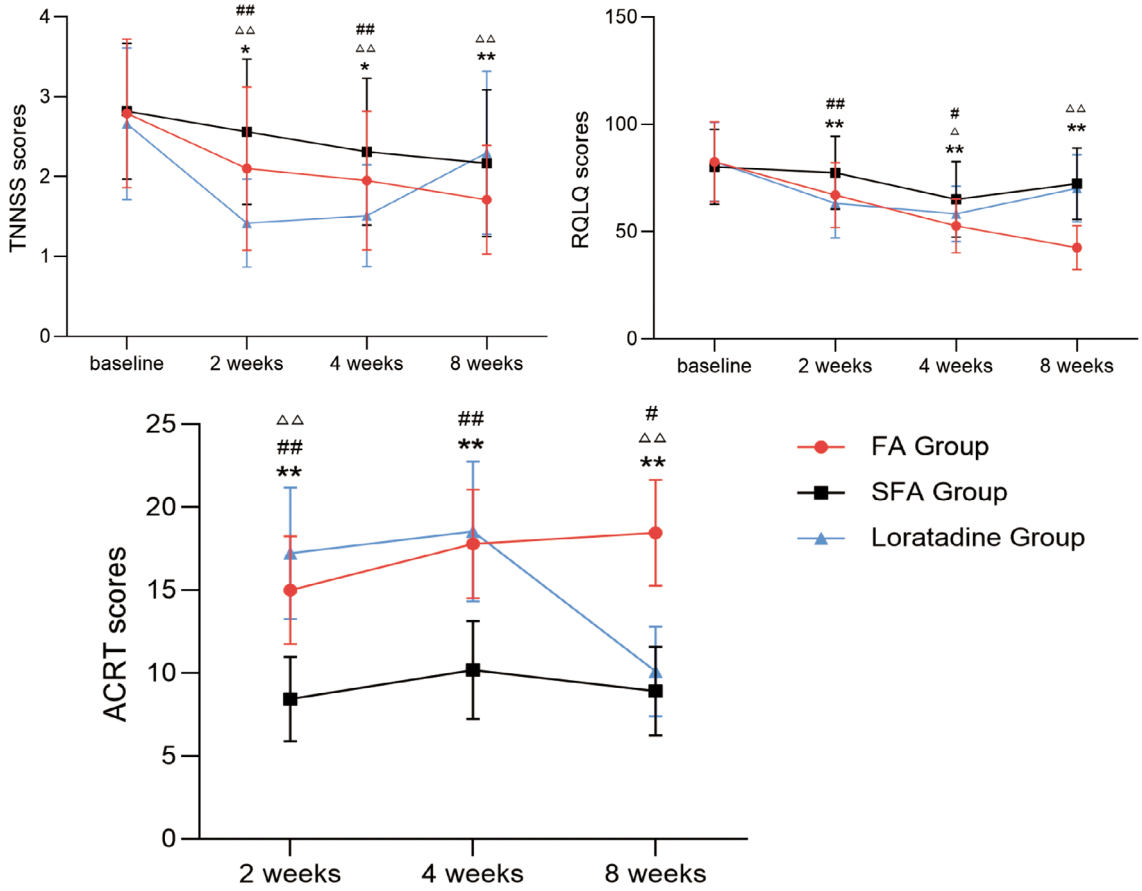

Fig. 5. Comparison of TNNSS, RQLQ and ACRT scores in patients with moderate–severe persistent AR among three groups ($\bar{x} \pm s$). $^{*}p < 0.05$, $^{**}p < 0.01$ FA group vs. SFA group at the same time point; $^{\triangle}p < 0.05$, $^{\triangle\triangle}p < 0.01$ FA group vs. Loratadine group at the same time point; $^{\#}p < 0.05$, $^{\#\#}p < 0.01$ Loratadine group vs. SFA group at the same time point. TNNSS: Total Non-Nasal Symptom Score; RQLQ: Rhinoconjunctivitis Quality of Life Questionnaire; ACRT: Allergic Rhinitis Control Test. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

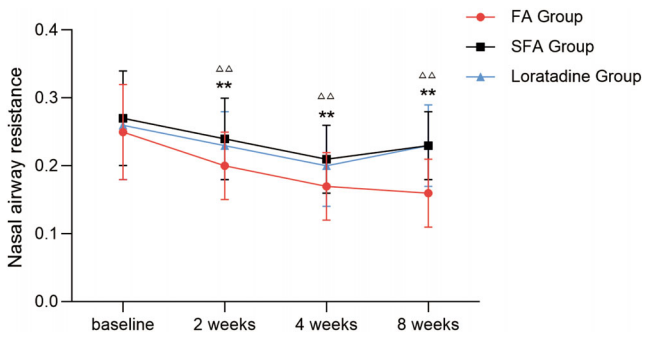

Fig. 6. Comparison of nasal airway resistance in patients with moderate–severe persistent AR among the three groups ($\bar{x} \pm s$). $^{*}p < 0.05$, $^{**}p < 0.01$ FA group vs. SFA group at the same time point; $^{\triangle}p < 0.05$, $^{\triangle\triangle}p < 0.01$ FA group vs. Loratadine group at the same time point; $^{\#}p < 0.05$, $^{\#\#}p < 0.01$ Loratadine group vs. SFA group at the same time point. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

(ExHN 9), to directly stimulate the nasal acupoints to stimulate qi and blood as well as to enhance the yang energy of the human body to allow the yang energy to dispel cold, thereby improving the symptoms of AR.

In Oriental medicine, Yingxiang (LI 20) is in the large intestine meridian of hand yangming, it is generally used in treating the nose diseases including rhinitis, sinusitis, and olfactory disorders in clinical practice.[27–30] The Neiyingxiang (ExHN 9) is an extrameridian point, which corresponds to the Yingxiang (LI20) point. This acupoint was discovered by ancient doctors and has demonstrated beneficial effects during its long history of use in clinical practice. It is commonly used for rhino disease such as olfactory disorders, chronic hypertrophic rhinitis, and allergic rhinitis.[31–33] Through the detection of immune molecules in rabbit serum and nasal mucosa, Gong et al. found that intranasal acupuncture treatment can significantly reduce the excitability of sensory nerves and parasympathetic nerves in the nasal mucosa and improve excitability of the sympathetic nerves.[34] It can also activate corresponding neuropeptides which regulate the immune response of the neuroimmune system, thereby improving the neurogenic inflammatory response and alleviating nasal symptoms.[34] Liu et al. find conventional acupuncture at ExHN 9 has also yielded favorable outcomes in treating allergic rhinitis.[35] However, there are few reports on fire-needle acupuncture in

Neiyingxiang (ExHN 9). Compared with traditional acupuncture, fire-needle acupuncture at the Neiyingxiang (ExHN 9) point in the treatment of allergic rhinitis has the advantages of less acupoint selection, no need for needle retention, direct effect, rapid onset, and no need for dialectical acupoint matching.

The mucosa of nasal at Neiyingxiang point is innervated by three nerves, including sensory nerve (nasociliary nerve), parasympathetic nerve (great superficial petrosal nerve), and sympathetic nerve (deep petrosal nerve). Acupuncture could stimulate the nasal nerve, activating the local blood and lymphatic circulation of the nose, shrinking the blood vessels around the inferior turbinate, reducing the sensitivity of the nasal mucosa to relieve the enlargement of the inferior turbinate and improve the ventilation of the nose.[33] The fire needle is heated to more than 800 degrees Celsius. The fire needle can not only stimulate local acupoints but also make local tissues degenerate and burns necrotic tissues, thereby activating white blood cells and macrophages.[36] Furthermore, the mucosal lining of the inferior turbinates is the first point of contact for inhaled allergens, making it an important site for allergic inflammation and nasal obstruction.[37] Surgical procedures such as nasal mucosa laser irradiation, radiofrequency, and chemical cauterization can reduce the sensitivity of the nasal mucosa by blocking local nerves, reducing vascular permeability, and decreasing glandular output, thereby relieving allergies.[38,39] Previous research has demonstrated that combination coblation-assisted turbinate reduction reduces symptoms more significantly in people with persistent allergies than medication therapy alone.[40] Radiofrequency turbinoplasty has been shown to be an effective and safe treatment for allergic rhinitis that does not respond to pharmacological treatments.[41] The fire needle can also have this effect by burning the local turbinate mucosa.

CONCLUSION

In summary, fire-needle pricking at Neiyingxiang (ExHN 9) can effectively improve the nasal allergy symptoms, turbinate oedema, and quality of life of patients with moderate to severe AR, and its effects are longer in duration in comparison to that in loratadine alone.

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BIBLIOGRAPHY

1. Wise SK, Damask C, Roland LT, et al. International consensus statement on allergy and rhinology: allergic rhinitis. *Int Forum Allergy Rhinol*. 2023; 2022:1-567.
2. Okubo K, Kurono Y, Ichimura K, et al. Japanese guidelines for allergic rhinitis 2020. *Allergol Int*. 2020;69(3):331-345.
3. Bousquet J, Khaltaev N, Cruz AA, et al. Allergic rhinitis and its impact on asthma (ARIA) 2008. *Allergy*. 2008;63(86):8-160.
4. Shou Y, Hu L, Zhang C, et al. Efficacy of acupuncture at three nasal acupoints plus acupoint application for perennial allergic rhinitis: a multicenter, randomized controlled trial protocol. *Trials*. 2020; 21(1):110.
5. Cheng L, Chen J, Fu Q, He S, Li H, Liu Z. Chinese Society of Allergy Guidelines for diagnosis and treatment of allergic rhinitis. *Allergy Asthma Immunol Res*. 2018;10(4):300-353.
6. Seidman MD, Gurgel RK, Lin SY, Schwartz RS, Baroody FM, Bonner RJ. Clinical practice guideline: allergic rhinitis. *Otolaryngol Head Neck Surg*. 2015;152(Suppl. 1):S1-S43.
7. Jo HR, Choi SK, Sung WS, Lee SD, Lee BW, Kim EJ. Thermal properties of warm- versus heated-needle acupuncture. *Evid Based Complement Alternat Med*. 2022;2022:4159172.
8. Chen Z, Zhou D, Wang Y, et al. Fire needle acupuncture or moxibustion for chronic plaque psoriasis: study protocol for a randomized controlled trial. *Trials*. 2019;20(1):674.
9. Han N, Wang Y, Xu J, Lu H. Tattoo-like dermatitis left after fire-needle therapy. *Clin Exp Dermatol*. 2022;47(6):1197-1198.
10. Ai J, Guo S, Wang Y, et al. Fire needle acupuncture at Neiyingxiang (EX-HN 9) in the treatment of moderate and severe refractory perennial allergic rhinitis: a case report. *Medicine (Baltimore)*. 2024;103(4):e37060.
11. Broek JL, Bousquet J, Agache I, et al. Allergic rhinitis and its impact on asthma (ARIA) guidelines-2016 revision. *J Allergy Clin Immunol*. 2017; 140(4):950-958.
12. Zhao J, Yan X, Gai J, et al. Efficacy of Bimin decoction for patients with perennial allergic rhinitis: an open-label non-inferiority randomized controlled trial. *Trials*. 2019;20(1):802.
13. Brinkhaus B, Ortiz M, Witt CM, et al. Acupuncture in patients with seasonal allergic rhinitis: a randomized trial. *Ann Intern Med*. 2013;158(4): 225-234.
14. Choi SM, Park JE, Li SS, et al. A multicenter, randomized, controlled trial testing the effects of acupuncture on allergic rhinitis. *Allergy*. 2013;68(3): 365-374.
15. Adam D, Grabenhenrich L, Ortiz M, Binting S, Reinhold T, Brinkhaus B. Impact of acupuncture on antihistamine use in patients suffering seasonal allergic rhinitis: secondary analysis of results from a randomised controlled trial. *Acupunct Med*. 2018;36(3):139-145.
16. Gao Y, Liu L, Li B, et al. Evaluation of the efficacy and safety of fire needle compared to filiform needle on knee osteoarthritis: study protocol for a randomized controlled trial. *Trials*. 2020;21(1):911.
17. Sun JY, Fan YH, Yang ZH, Jin R, Xin P, Cai XM. Et al.Efficacy and safety of fire-needle in the treatment of gouty arthritis: a protocol for systematic review and meta analysis. *Medicine (Baltimore)*. 2020;99(30):e21259.
18. Cheng SL, Xu JC, Wang JG, et al. Clinical application and basic research status of fire needle therapy. *J Clin Acupunct Moxibust*. 2015;31(9):80-82.
19. Liu Y, Zhu T. Research on the clinical effect and the influence of EASI, pruritus score and serum factor levels for treating chronic eczema with fire needle. *J Liaon Univ TCM*. 2018;5(20):119-121.
20. Liu Q, Yang J, Su M, Wang Y, Xue W. Advances in clinical researches on the treatment of chronic urticaria with characteristic acupuncture. *J Clin Acupunct Moxibust*. 2020;36(1):87-91.
21. Zhao LP, Liu L, Wang YZ, et al. Preliminary study on the 'breaking' and 'standing' effects of fire needle therapy and its clinical application. *J Tradit Chin Med*. 2019;60(14):1255-1257.
22. Sun D, Jiang M, Lu M, Ma X, Shang G, Wang Y. The effect of warm acupuncture on EOS, IgE, inflammatory factors, and T lymphocyte subsets in patients with allergic rhinitis of lung qi deficiency and cold-type. *Altern Ther Health Med*. 2023;29(8):271-277.
23. Li ZJ. A clinical study on treating allergic rhinitis by fire acupuncture plus moxibustion. *Clin J Chin Med*. 2018;10(4):21-22.
24. Lu J, Li X, Qiu ZH, Li JW, Su LF. Observation on the curative effect of fire acupuncture combined with acupoint catgut embedding in the treatment of allergic rhinitis. *Chin Med Digest: Otorhinolaryngol*. 2022;37(4):91-92.
25. Chen S, Liu XY, Feng WQ, Xie YL, Tang CQ. Treatment of 55 cases of allergic rhinitis with deficiency-cold type by fire needle and warm acupuncture. *J Guangxi Univ Chin Med*. 2020;23(1):19-20.
26. Li YF. Treatment of 60 cases of allergic rhinitis with fire needle and flash cupping. *China's Naturopathy*. 2013;21(6):27.
27. Kim AR, Choi JY, Kim JI, Jung SY, Choi SM. Acupuncture treatment of a patient with persistent allergic rhinitis complicated by rhinosinusitis and asthma. *Evid Based Complement Alternat Med*. 2011;2011:798081.
28. Zhen M, He F, Wu M, Zheng L. Effects of acupuncture at different groups of Yangming Meridian points on allergic rhinitis. *Shanghai J Acu-Mox*. 2011;30(1):35-37.
29. Li X, Liu Y, Zhang Q, et al. Effect of catgut implantation at acupoints for the treatment of allergic rhinitis: a randomized, sham-controlled trial. *BMC Complement Altern Med*. 2016;16(1):454.
30. Ortiz M, Witt CM, Binting S, et al. A randomised multicentre trial of acupuncture in patients with seasonal allergic rhinitis – trial intervention including physician and treatment characteristics. *BMC Complement Altern Med*. 2014;14(1):128.
31. Liu Q, Liu J. Acupuncture treatment at Neiyingxiang on olfactory disorder. *Beijing Acta Chi Med Pharmacol*. 2011;18(2):21-22.
32. Ai J, Gai J, Wang M, Guo S, Wang J. Efficacy observation of fire needle acupuncture for chronic hypertrophic rhinitis and its effect on nasal ventilation. *Shanghai J Acu-Mox*. 2021;40(8):959-962.
33. Li Y, Wang D, Han K, Li W, Liu Y, Jing T. Clinical study of intranasal acupuncture treating allergic rhinitis. *J Clin Acupunct Moxibust*. 2019;35(5): 25-29.

34. Gong Z, Yan ZF, Liu QP, Liu LL, Liu SM, Jiao LL. Effect of intranasal acupuncture on neurogenic inflammation in allergic rhinitis rabbits. *Acupunct Res*. 2021;46(2):111-116.
35. Liu L, Gong Z, Tang L, Yan Z. A novel and alternative therapy for persistent allergic rhinitis via intranasal acupuncture: a randomized controlled trial. *Eur Arch Otorhinolaryngol*. 2023;280(6):2773-2783.
36. Ai JW, Wang JG, Wang M, Guo SY, Gai JQ. Clinical observations on fire needle pricking bloodletting at point Neiyingxiang(ex-HN9) for acute bacterial tonsillitis. *Shanghai J Acu-Mox*. 2020;39(8):1043-1046.
37. Soumya S, Adegboyega G, Elhassan H. Surgical approaches for allergic rhinitis: a systematic review protocol. *Int J Surg Protoc*. 2021;25(1):178-183.
38. Şapçi T, Şahin B, Karavus A, Akbulut UG. Comparison of the effects of radiofrequency tissue ablation, CO2 laser ablation, and partial turbinectomy applications on nasal mucociliary functions. *Laryngoscope*. 2010;113(3):514-519.
39. Kankaanp A, Harju T, Numminen J. The effect of inferior turbinate surgery on quality of life: a randomized, placebo-controlled study. *Ear Nose Throat J*. 2021;100(10):1107S-1112S.
40. Businco LDR, Businco ADR, Lauriello M. Comparative study on the effectiveness of Coblation-assisted turbinoplasty in allergic rhinitis. *Rhinology*. 2010;48(2):174-178.
41. Lin H, Lin P, Friedman M, et al. Long-term results of radiofrequency turbinoplasty for allergic rhinitis refractory to medical therapy. *Arch Otolaryngol Head Neck Surg*. 2010;136(9):892-895.