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Original Article

Early intervention improves clinical responses to seasonal allergic rhinitis by stimulation in sphenopalatine ganglion (Xinwu acupoint)

GUO Yuhao, HUANG Liangran, ZHANG Lei, YANG Wei, HUANG Lixia, LIU Wei, FAN Yuyan

GUO Yuhao, Department of Traditional Chinese Medicine, Beijing Tiantan Hospital, Capital Medical University, Beijing 100050, China; Beijing Neurosurgical Institute, Beijing 100050, China
HUANG Liangran, LIU Wei, Department of Neurosurgery, Beijing Tiantan Hospital, Capital Medical University, Beijing 100050, China
ZHANG Lei, Department of Radiology, Beijing Tiantan Hospital, Capital Medical University , Beijing 100050, China
YANG Wei, Department of Traditional Chinese Medicine, Beijing Tongren Hospital, Beijing 100005, China
HUANG Lixia, FAN Yuyan, Department of Traditional Chinese Medicine, Beijing Tiantan Hospital, Capital Medical University, Beijing 100050, China
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Correspondence to: Prof. FAN Yuyan, Department of Traditional Chinese Medicine, Beijing Tiantan Hospital, Capital Medical University, Beijing 100050, China. fanyy2002@hotmail.com
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Abstract

OBJECTIVE: To examine the efficacy of early intervention (4 weeks before pollen dispersal) with sphenopalatine ganglion (Xinwu acupoint) stimulation in patients with allergies after the onset of seasonal allergic rhinitis (SAR).

METHODS: This is a prospective, randomized and unblinded half-open study. Forty-one SAR volunteers were randomly assigned to either the sphenopalatine ganglion (SPG) acupuncture plus supplementary acupuncture (SPG group) or the sham-SPG acupuncture plus supplementary acupuncture (SA group) stimulation 4 weeks before the onset of allergy season. The changes of the total nasal symptom score (TNSS) and the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) scores were measured on the first week in the onset of allergy season.

RESULTS: Four patients dropped out due to local hematoma and pain in the SPG and SA groups. The remaining 37 patients continued through to the end of the trial. After early intervention 4 weeks before the onset of allergy season, the sneezing, nasal congestion and itchiness scores in the first week of onset time were significantly lower in the SPG group than in the SA group patients ($P < 0.001$). The RQLQ score obtained at the onset of symptoms indicated that symptoms were more significantly ameliorated in the SPG group than in the SA group ($P < 0.001$).

CONCLUSIONS: The results of this study confirmed that early intervention by sphenopalatine ganglion (Xinwu acupoint) stimulation can effectively improve the symptoms and the quality of SAR patients' daily lives.

Keywords: rhinitis, allergic, seasonal; acupuncture; sphenopalatine; Xinwu acupoint; early intervention

1. INTRODUCTION

Seasonal allergic rhinitis (SAR) is an allergic reaction that occurs when various allergens interact with specific immune globulin E (IgE) antibodies after binding to the nasal mucosa, causing a series of allergic conjunctivitis, rhinitis and asthma. It has obvious temporal and regional characteristics is susceptible to certain meteorological factors. The disease has a high prevalence, especially in industrialized countries, where it has exhibited a fairly rapid upward trend.[1] Wang et al found that the detection rate of pollen in inhaled allergens could be as high as 64.4% based on the specific IgE tests from 200 000 outpatients.[2] Wang *et al*[3] showed that the prevalence of allergic rhinitis (AR) in Inner Mongolia was 32.4%, and more than half of the affected individuals had fever-related SAR, with a prevalence of 18.5%. SAR causes major illness and disability worldwide, and reduces quality of life and productivity regardless of ethnicity, sex, and age.[4] Some patients develop asthma, further increasing medical and social burdens. Conventional medical treatments for SAR include H1-antihistamines,

glucocorticosteroids, leukotriene antagonists, decongestants, anticholinergics, and specific immunotherapy.[5] However, the effect of these medications generally lasts for only a short period of time and often results in unwanted side effects.[6,7] They can restrict daily activities by disturbing patients' sleep and causing headaches and poor concentration. Antihistamines commonly cause side effects such as fatigue, dizziness, headache, sleepiness and sore throat. However, several clinical studies have reported that 27% to 46% of those who prefer what they consider to be more natural remedies often use complementary and alternative treatments for their allergic symptoms,[8-10] and most patients who have not yet used such treatments intend to do so in the future. In particular, acupuncture is used by 17% to 19% of allergic rhinitis patients.[11] A recent study from Australia showed that acupuncture was more effective than sham acupuncture treatment for persistent allergic rhinitis,[12] similar to that found in Germany.[13] "Biqiu", a terminology originating from the classical Traditional Chinese Medicine (TCM) literature *Huang Di Nei Jing*,[14] is a disease in TCM that demonstrates a set of symptoms that are similar to those of AR.[15] In TCM, the basic pathogenesis of 'Biqiu' is inadequate functioning of the lung '*Qi*' caused by external or internal pathogenic factors, often companied by '*Qi*' insufficiency in the spleen and kidney. Acupuncture and herbal moxibustion are commonly used for treating AR symptoms (i.e., 'Biqiu'). Acupuncture may regulate the function of lung '*Qi*', unblocking the meridians and replenishing the '*Qi*' of the spleen and kidney. Recently, the systematic constitutional theory of TCM was proposed, to which improvements have gradually been made.[16] We found that the physical characteristics of allergic rhinitis had been evaluated according to Professor Wang's nine constitutional theories of TCM as *Qi* deficiency and special diasthesis.[16-19]

A large case study suggested that "Xinwu acupoint" (sphenopalatine ganglion) stimulation with one acupuncture needle, a technique developed by a Chinese otolaryngologist and applied to more than 130 000 Chinese patients,[20,21] offers potential advantages with regard to nasal symptoms, symptom onset time, duration of treatment effectiveness, and quality of life. The "Xinwu acupoint" was discovered by Professor Li in the 1960s. Prior to this discovery, Golding-Wood had invented vidian neurectomy to treat chronic vasomotor rhinitis.[22] However, the surgery was abandoned because of xerophthalmia, a postoperative complication that may decrease the quality of life of patients. Professor Li proposed that sphenopalatine ganglion ("Xinwu acupoint") stimulation with one acupuncture needle could regulate the balance of the sympathetic and parasympathetic nerves through this acupoint as well as the levels of neurotransmitters and changes in substance P and neuropeptide Y,[23] which reflect the excitability of sensory nerves and sympathetic nerves, respectively.[20]

Several clinical studies have found that early intervention with oral cysteinyl leukotriene receptor antagonists (LTRA),[24] hydrolyzed formulas and allergen immunotherapy (AIT) may prevent sneezing and nasal congestion.[25,26] Therefore, we hypothesize that sphenopalatine ganglion stimulation in the early phase may improve clinical responses at the onset of SAR.

2. METHODS

2.1. Trial registration

This study was approved by the Ethics Committee of the Beijing Tiantan Hospital and performed according to the ethical standards of the Declaration of Helsinki and approved guidelines.

2.2. Study subjects and study design

Based on the characteristics of the TCM constitution of AR, 41 SAR volunteers between 18-60 years old were recruited and randomly assigned to either the sphenopalatine ganglion (SPG) stimulation plus the supplementary acupuncture group (SPG group) or the sham-SPG plus supplementary acupuncture group (SA group) according to a computer-generated random allocation at the Beijing Tiantan Hospital from July 2016 to December 2018. This was performed by an experienced acupuncture practitioner who was provided with the randomization sequence in a sealed envelope. This study was approved by the Ethics Committee of the Beijing Tongren Hospital and performed according to the ethical standards of the Declaration of Helsinki and approved guidelines.

2.3. Inclusion criteria

Patients who were diagnosed with AR and tested positive for all the following criteria in terms of the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines were included in the study:[27] (a) seasonal or discontinuous symptoms of anterior rhinorrhea, continuous sneezing, nasal obstruction and itching; (b) pale and edematous nasal mucosa, nasal discharge and swollen inferior turbinates on nasal endoscopy; and (c) positive antigen skin prick test (SPT) (Allergopharma, Reinbeck, Germany).

2.4. Exclusion criteria

AR patients meeting the following criteria were excluded from the study: (a) hypertension, diabetes or other chronic diseases; (b) tumors in the nasal cavity; (c) eczema, asthma, or SAR triggered by grass pollen (Gaint Ragweed; Mugwort; Lamb's quarter; Humulus; Chenopodium album and so on); (d) antihistamines, anticholinergics, corticosteroids, decongestants or antibiotics administered within2 weeks before enrollment; (e) receipt of any of the following before treatment: systemically administered corticosteroids within 6 months, special immune therapy within 1 year, or alternative and complementary modality, that is,

acupuncture or herbal medication, for the treatment of AR within 2 months; (f) pregnancy or planning for pregnancy; and (g) heavy smoking. A positive SPT result was defined as a wheal greater than or equal to one-half of the diameter of the histamine control and at least 3 mm larger than the diameter of the negative control.[28] We defined mixed allergen allergy as positive results for two or more allergens in the skin test. Skin testing was performed by specialist technicians and nurses, while AR diagnoses were made by clinical rhinologists.

2.5. Endpoints and censoring criteria in early intervention

The endpoints of the trial included participants who (a) experienced a serious adverse event and were ineligible for continuous treatment, (b) suffered from serious complications and aggravated symptoms, and (c) refused to continue to participate in clinical observations during the clinical trial.

Censoring criteria included (a) patients who did not undergo clinical observations according to the protocol and could not be evaluated, (b) patients who quit voluntarily during clinical observation, and (c) any indication that continuing the clinical trial might cause adverse reactions to the participant.

2.6. Randomization and blinding in early intervention

This randomized clinical trial was executed by the Department of Otolaryngology Surgery and the Department of TCM, Beijing Tiantan Hospital, using block randomization to generate the random allocation sequence. Opaque sealed envelopes were prepared for the predetermined computer-made randomization sequence. The envelopes were numbered consecutively and connected with a string. Each envelope was separated from the string and then opened in sequence after the run-in period when the participants were already registered in the trial. Outcome assessors and personnel who dealt with the data collection and data analysis were blinded throughout the entire trial. The patients were blinded and randomized to different groups. However, the acupuncturist could not be blinded because of the nature of the two different acupuncture techniques in this trial; however, the physicians were trained not to communicate with the participants or outcome assessors regarding the treatment procedures and responses. The researchers were divided into two groups. The otolaryngology surgery physicians were responsible for the diagnosis and therapeutic assessment of the patients. The acupuncturists were responsible for the acupoint localization and acupuncture performance. If the patient met the inclusion criteria, the person in charge of the envelopes gave the specified envelope to the acupuncturist. To preserve masking, only the acupuncturists had access to the treatment allocation. The posttreatment patient questionnaire, the entry of the observation diary and the posttreatment statistics were completed independently by student volunteers of Capital Medical University.

2.7. Interventions

Participants underwent a standardized interview and received additional information regarding the study. The acupuncturists for the control group were required to have over10 years of clinical experience and an acupuncture license issued by the Ministry of Health of the China. In addition to these criteria, the acupuncturists for the interventional group had to have been trained by Professor YANG Wei, a disciple of LI Xinwu, the inventor of the sphenopalatine ganglion stimulation technique; have relevant neuroanatomic knowledge; be able to perform the technique clinically; have practiced no fewer than 10 times under Professor YANG Wei's supervision; and have practiced independently no fewer than 2000 times. Before the trial, all acupuncturists received special training in the purpose and procedures of the trial, therapeutic strategies, and quality control.

The SAR patients were started on their treatment 4 weeks before the onset of allergy season. All participants received health education and were asked to change their habits, including aerobic exercising for at least half an hour every day, going to bed in the evening and waking up early in the morning, and maintaining a good mood 4 weeks before the onset of allergy season. At the same time, all patients underwent one session of supplementary acupuncture per week performed with a disposable sterile acupuncture needle (0.25 mm diameter, 25 or 40 mm length; Beijing Zhongyan Taihe Medicine Co. Beijing, China). The acupoints (Table 1) were selected based on the special TCM constitution of SAR. We found that the TCM constitutions of AR are *Qi* deficiency and special diasthesis.[16-19] The main points were selected to invigorate '*Qi*' and strengthen the spleen. The depth of insertion varied between 10 and 30 mm (Table 1). The acupuncturist manually manipulated the acupuncture needles until he or she achieved 'De *Qi*' (the sensation of tenseness around the needle felt by the practitioner and numbness, distension, soreness, and heaviness around the acupoint felt by the patient); then, the needle position was maintained for 25 min.

In the interventional group (SPG group), the patients addition to supplementary acupuncture, also received SPG acupuncture by the acupuncturists used one disposable sterile acupuncture needle (0.35 mm diameter, 60 mm length; Beijing Zhongyan Taihe Medicine Co. Beijing, China) to stimulate the SPG. After local disinfection, the needle was gradually inserted between the zygomatic arch and the coronoid process of the mandible to a depth of approximately 55 mm to enter the pterygopalatine fossa. Figure 1 depicts this procedure in more detail. Once the needle touched the SPG and the patients experienced the abovementioned sensation (radiating toward the nose), the patients signaled to the acupuncturist with his or her hand, and the needle was withdrawn immediately. The SPG was stimulated unilaterally in each session. Patients underwent 4 such sessions throughout the trial, receiving 1 session per week.

Table 1 Supplementary acupuncture points and techniques for early intervention for seasonal allergic rhinitis

Acupoint	Direction	Depth (mm)
Pishu (BL20)	Obliquely toward the spine	13 to 20
Weishu (BL21)	Obliquely toward the spine	13 to 20
Zhongwan (CV12)	Perpendicular to the skin	8 to 13
Qihai (CV6)	Perpendicular to the skin	8 to 13
Zusanli (ST16)	Perpendicular to the skin between 20 to 30 the	13 to 25
Sanyinjiao (SP36)	Perpendicular to the skin	13 to 25
Baihui (GV20)	Transversely and downward toward the nose	10 to 15
Yintang (GV29)	Perpendicular to the skin	5 to 8

2.8. Procedure

The SAR patients were started on their treatment 4 weeks before the onset of allergy season. First, all participants recorded the rhinitis symptoms they experienced in the previous year. All participants received health education 4 weeks before the onset of allergy season. Based on the predetermined randomized allocation placed in the envelopes, the participants were randomly allocated to the SPG group or the SA group (Figure 1); they had equal probability of being assigned to either of the two groups. After all participants had received 4 weeks of treatment during the trial, they were asked to record any acute symptoms they experienced during the first week, as well as the use of any acute symptomatic relief medication during the treatment period, in a rhinitis diary. A case report, containing data on the outcome measures, and the rhinitis diaries were collected separately from the hospitals by blinded interviewers. Blinded telephone interviewers contacted the participants regarding periods of moderate to severe allergic rhinitis experienced during the 4 weeks after the treatment period to evaluate the long-term effects of the acupuncture.

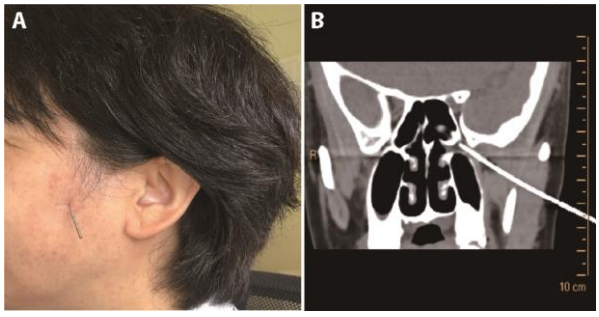

Figure 1 The location of the acupuncture needle in sphenopalatine ganglion (Xinwu acupoint)
A: acupuncture needle points. The sphenopalatine ganglion (Xinwu acupoint), stimulated with a needle of 0.35 mm diameter and 60 mm length, is located under the zygomatic arch between the coronoid process and the mandibular condyle, B: high-resolution CT scan of the pterygopalatine fossa in the coronal plane after acupuncture showing needle penetration into the pterygopalatine fossa. Arrow: the acupuncture is inserted into the sphenopalatine ganglion (Xinwu acupoint).

All participants received health education and were asked to change their habits, including aerobic exercising for at least half an hour every day, going to bed in the evening and waking up early in the morning, and maintaining a good mood 4 weeks before the onset of allergy season. Supplementary acupuncture was performed once per week; the acupoints were selected based on the special TCM constitutions of AR before the start of acute symptoms.

Patients underwent early intervention with health education, and supplementary acupuncture was performed once per week. Plus sham-SPG (SA group, n = 20); Plus the SPG (SPG group, n = 21).

2.9. Outcome measures

The main outcome of this study was the total nasal symptom score (TNSS).[29] The primary efficacy indicators included four common symptoms of SAR: rhinorrhea, nasal obstruction, sneezing, and nasal itching. Each symptom score was assessed by a visual analog scale (VAS), which assigned a score from 0 to 10 depending on the severity of the corresponding symptom. A score of "0" means that the symptom was not experienced, and a score of "10" means that the symptom was so severe that patients could barely tolerate it. On the last day, the patient was asked to mark the score for the symptom on the scale. The TNSS was calculated by summing the scores for the above four symptoms.

The secondary outcome indicators included the evaluation of quality of life and medication dosage during follow-up. Quality of life was evaluated according to the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ).[30] The main evaluation parameters were sleep, nasal symptoms, ocular symptoms, nonnasal/nonocular symptoms, behavior and emotional function. Confidence assessment included a 7-day baseline established during the run-in period, as well as the nasal symptom scores and quality of life after the treatment.

2.10. Data collection

During the study, data were collected before and after treatment at weeks 0 and 1, where ‘week 0’ approximately corresponds to the first week on the onset of allergy season in the previous year, and ‘week 1’ approximately corresponds to the first week after treatment on the onset of allergy season this year. The trial was held at least two years. Physical signs and the RQLQ score were calculated by the outcome assessors and subjectively assessed at least five times (once a day). Participants were asked to record any acute symptoms experienced in the first week after treatment, as well as the use of any acute symptomatic relief medication during the treatment, in a rhinitis diary. The case report,

containing data on the outcome measures, and the rhinitis diaries were collected separately by blinded telephone interviewers after the first post treatment week. Participants were also asked to report any adverse events, including discomfort, bruising, or subcutaneous hematoma around the needle insertion site, nausea, or feeling faint, after each treatment. Compliance and reasons for discontinuation were documented in the case report form until week 1 for patients experiencing acute symptoms. Participants who had withdrawn from the study were contacted by telephone or mail to ascertain the reasons for dropout and to record the time of the last treatment and last assessment. For withdrawal caused by adverse events or dissatisfaction with the treatment, the dropout participants were provided other suitable treatments.

2.11. Statistical analysis

Data analyses were performed using SPSS 19.0 software (IBM Corp., Armonk, NY, USA). Normally distributed data, as assessed by the Kolmogorov-Smirnov test, are expressed as the mean ± standard deviation, and nonnormally distributed data as the median with interquartile range (*IQR*). Differences in baseline values between the SPG group and SA group were compared using the independent *t* test or the Mann-Whitney *U* test. Sex ratios were compared using the χ^2 test. The paired *t* test or the Wilcoxon rank-sum test was used to compare differences between past nasal symptoms and symptoms after intervention in the SPG group and SA group. Differences in symptoms after intervention between the SPG group and SA group were compared using the independent *t* test or the Mann-Whitney *U* test. Two-sided *P* values < 0.05 were considered statistically significant.

3. RESULTS

3.1. Early intervention in SAR

A total of 41 SAR patients were divided into two groups (SA and SPG). No significant differences were observed in the TNSS or RQLQ between the two groups before treatment (Table 2). Four subjects dropped out of the treatment, equivalent to a dropout rate of 9.8%; the 37 subjects and investigators involved in the study, as well as the statistician who analyzed the data, were blinded to the treatment groups (Figure 2).

3.2. TNSS

In the first week of acute symptom onset, compared to those of past nasal symptoms, all indicators of present nasal symptoms were improved following early intervention ($P < 0.001$; Tables 3, 4). After 4 weeks of early intervention, compared with the SA patients, the SPG patients showed significantly improved onset nasal symptoms at week 1 ($P < 0.001$, respectively) (Table 5).

3.3. Quality of life

Except for the nonnasal/nonocular symptoms and emotion function scores in the SA group and scores in the SPG, the RQLQ scores obtained after 4 weeks of treatment were significantly lower than those obtained just before treatment ($P < 0.001$; Tables 3, 4). The RQLQ scores indicated that symptoms were more significantly ameliorated in the SPG group than in the SA group ($P < 0.001$; Table 5).

3.4. Safety analysis

During the clinical trial, 4 patients dropped out due to local hematoma and pain in the SPG and SA groups. The remaining 37 patients participated through the end of the trial.

Table 2 Baseline characteristics of the SA and SPG groups

Item	SPG group (n = 19)	SA group (n = 18)	P value
Age (years)	33.4±10.9	42.6±8.2	0.006
Sex [male, *n* (%)]	7 (41.2)	10 (58.8)	0.402
Duration (years)	10.4±3.6	11.32±5.0	0.523
TNSS	31.5±5.3	34.2±2.7	0.069
Nasal obstruction	7.4±2.1	8.3±1.2	0.097
Nasal itching	7.6±1.9	8.2±1.1	0.228
Sneezing	8.3±1.2	8.7±1.0	0.266
Rhinorrhea	8.2±1.6	8.9±1.0	0.155
RQLQ	89.5 (73.8, 104.3)	89.0 (66.0, 94.0)	0.543
Sleeping	10.0 (8.5, 14.5)	12.0 (6.0, 15.0)	0.939
Nonnasal/nonocular symptoms	23.5 (17.3, 28.8)	21.0 (13.0, 28.0)	0.360
Behavior	11.5 (9.0, 14.5)	13.0 (10.0, 17.0)	0.328
Nasal symptoms	15. (11.0, 20.3)	16.0 (11.0, 21.0)	0.725
Ocular symptoms	15.0 (10.0, 17.3)	11.0 (6.0,20.0)	0.404
Emotional function	14.5 (9.8, 19.3)	15.0 (7.0, 19.0)	0.522

Notes: SPG group: early intervention with health education, and acupuncture on sphenopalatine ganglion (Xinwu acupoint) with supplementary acupuncture were performed once a week for four weeks; SA group: early intervention with health education, and acupuncture on sham-SPG acupuncture with supplementary acupuncture were performed once a week for four weeks; TNSS: total nasal symptom score; RQLQ: Rhinoconjunctivitis Quality of Life Questionnaire. Values are expressed as the mean ± standard deviation or the median with *IQR* for data found to be nonnormally distributed according to the Kolmogorov-Smirnov test. Data were tested by the independent *t* test and the Mann-Whitney *U* test. Sex ratios were compared using the χ^2 test. Two-sided *P* values < 0.05 were considered statistically significant.

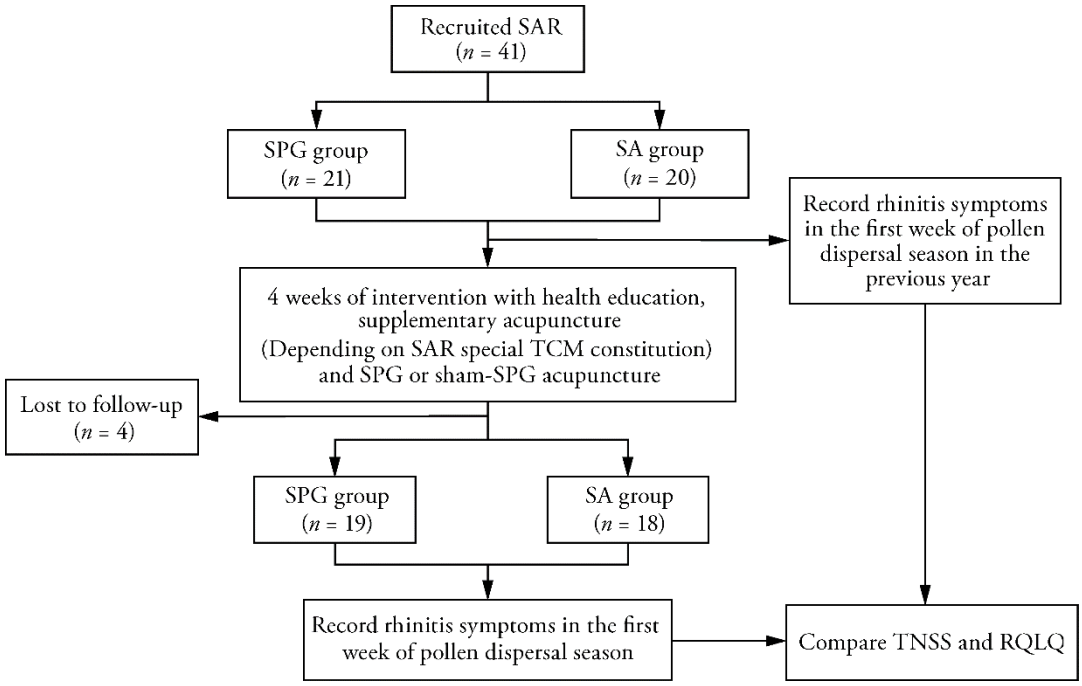

Figure 2 Flow diagram of the trial
SAR: seasonal allergic rhinitis; SPG: sphenopalatine ganglion; SA: sham acupuncture; TCM: Traditional Chinese Medicine; TNSS: total nasal symptom score; RQLQ: rhinoconjunctivitis auality of life questionnaire.

Table 3 Difference in nasal symptom scores and RQLQ scores between past nasal symptoms and symptoms after 4 weeks of intervention with health education, supplementary acupuncture in the SA group

Item	Past nasal symptoms	Symptoms after intervention	*P* value
TNSS	34.2±2.7	26.2±4.2	< 0.001
Nasal obstruction	8.3±1.2	6.7±1.5	< 0.001
Nasal itching	8.2±1.1	6.4±1.2	< 0.001
Sneezing	8.7±1.0	6.7±1.2	< 0.001
Rhinorrhea	8.9±1.0	6.3±1.5	< 0.001
RQLQ	89.0 (66.0, 94.0)	64.0 (58.0, 74.0)	< 0.001
Sleeping	12.0 (6.0, 15.0)	8.0 (6.0, 12.0)	0.054
Nonnasal/nonocular symptoms	21.0 (13.0, 28.0)	16.0 (12.0, 22.0)	0.159
Behavior	13.0 (10.0, 17.0)	11.0 (9.0, 12.0)	0.030
Nasal symptoms	16.0 (11.0, 21.0)	12.0 (9.0, 14.0)	0.001
Ocular symptoms	11.0 (6.0, 20.0)	9.0 (8.0, 12.0)	0.025
Emotional function	15.0 (7.0, 19.0)	10.0 (8.0, 12.0)	0.106

Notes: past nasal symptoms: the symptoms correspond to the first week on the onset of allergy season in the previous year; Symptoms after intervention: the symptoms correspond to the first week after treatment on the onset of allergy season this year; TNSS: total nasal symptom score; RQLQ: rhinoconjunctivitis quality of life questionnaire. Nasal symptom scores are expressed as the mean ± standard and were tested by the paired *t* test. RQLQ scores are expressed as the median with *IQR* and were tested by the Wilcoxon rank-sum test. Two-sided *P* values < 0.05 were considered statistically significant.

4. DISCUSSION

SAR, also known as "Biqiu", is characterized by an acute onset, a ferocious oncoming force, and fast changes, consistent with the mobile and changeable characteristics of the wind evil according to the theory of TCM. Its pathogenesis is mainly due to deficiency of the lung, spleen and kidney, which are attacked by the pathogenic factors of wind/cold and evil '*Qi*'.[16] Therefore, treatment should aim to strengthen body resistance and treat both the manifestations and actual causes of the disease. Deficiency of pattern in spleen *Qi*, lung *Qi* and kidney *Qi* are mostly manifested in patients.[12] Previous studies have shown that *Qi* deficiency and special diasthesis[16-19] were more associated with AR than with nonallergic rhinitis.

In this study, we recruited patients to receive early intervention with health education (sleeping for at least 8 h a night, avoiding staying up late, aerobic exercising for at least an hour every day, and maintaining a good mood) as well as prophylactic supplementary acupuncture to reduce the onset of SAR symptoms in order to improve the constitutions of the patients and eventually prevent SAR. The main and adjunct acupoints were selected according to the special TCM constitutions of AR, including Baihui (GV20), Yintang (EX-HN3), Pishu (BL20), Weishu (BL21), Zhongwan (CV12), Qihai (CV6), Zusanli (ST16), and Sanyinjiao (SP36). Our results showed that compared to those of past nasal symptoms, all indicators of current nasal symptoms improved following early intervention ($P < 0.001$).

Table 4 Difference in nasal symptom scores and RQLQ scores between past nasal symptoms and symptoms after 4 weeks of intervention with health education, supplementary acupuncture in the SPG group

Item	Past nasal symptoms	Symptoms after intervention	*P* value
TNSS	31.5±5.3	15.3±4.4	<0.001
Nasal obstruction	7.4±2.1	3.4±1.8	<0.001
Nasal itching	7.6±1.9	3.6±1.7	<0.001
Sneezing	8.3±1.2	4.0±1.5	<0.001
Rhinorrhea	8.2±1.6	4.4±1.6	<0.001
RQLQ	89.5 (73.8, 104.3)	41.0 (27.8, 53.8)	<0.001
Sleeping	10.0 (8.5, 14.5)	3.0 (2.8, 6.0)	0.001
Nonnasal/nonocular symptoms	23.5 (17.3, 28.8)	11.5 (7.0, 14.0)	<0.001
Behavior	11.5 (9.0, 14.5)	6.0 (5.3, 11.3)	0.001
Nasal symptoms	15.5 (11.0, 20.3)	8.0 (5.8, 10.0)	<0.001
Ocular symptoms	15.0 (10.0, 17.3)	5.5 (2.8, 7.3)	<0.001
Emotional function	14.5 (9.8, 19.3)	8.0 (3.0, 11.3)	0.002

Notes: past nasal symptoms: the symptoms correspond to the first week on the onset of allergy season in the previous year; symptoms after intervention: the symptoms correspond to the first week after treatment on the onset of allergy season this year; TNSS: total nasal symptom score; RQLQ: rhinoconjunctivitis quality of life questionnaire. Nasal symptom scores are expressed as the mean ± standard and were tested by the paired *t* test. RQLQ scores are expressed as the median with *IQR* and were tested by the Wilcoxon rank-sum test. Two-sided *P* values < 0.05 were considered statistically significant.

Table 5 Difference in the symptoms after 4 weeks of intervention with health education, supplementary acupuncture in terms of nasal symptom scores and RQLQ scores between the SA and SPG groups

Item	SPG group (*n* = 19)	SA group (*n* =18)	*P* value
TNSS	15.3±4.4	26.2±4.2	<0.001
Nasal obstruction	3.4±1.8	6.7±1.5	<0.001
Nasal itching	3.6±1.7	6.4±1.2	<0.001
Sneezing	4.0±1.5	6.7±1.2	<0.001
Rhinorrhea	4.4±1.6	6.3±1.5	0.001
RQLQ	41.0 (27.8, 53.8)	64.0 (58.0, 74.0)	<0.001
Sleeping	3.0 (2.8, 6.0)	8.0 (6.0, 12.0)	0.001
Nonnasal/nonocular symptoms	11.5 (7.0, 14.0)	16.0 (12.0, 22.0)	0.007
behavior	6.0 (5.3, 11.3)	11.0 (9.0, 12.0)	0.006
Nasal symptoms	8.0 (5.8, 10.0)	12.0 (9.0, 14.0)	0.002
Ocular symptoms	5.5 (2.8, 7.3)	9.0 (8.0, 12.0)	0.001
Emotional function	8.0 (3.0, 11.3)	10.0 (8.0, 12.0)	0.089

Notes: SPG group: early intervention with health education, and acupuncture on sphenopalatine ganglion (Xinwu acupoint) with supplementary acupuncture were performed once a week for four weeks; SA group: early intervention with health education, and acupuncture on sham-SPG acupuncture with supplementary acupuncture were performed once a week for four weeks; TNSS: total nasal symptom score; RQLQ: rhinoconjunctivitis quality of life questionnaire; *IQR*: interquartile range. Nasal symptom scores are expressed as the mean ± standard deviation and were tested by the paired *t* test. RQLQ scores are expressed as the median with *IQR* and were tested by the Wilcoxon rank-sum test. Two-sided *P* values < 0.05 were considered statistically significant.

Except for the nonnasal/nonocular symptoms and emotion function scores in the SA group and all scores in the SPG group, after 4 weeks of early intervention, the RQLQ scores were significantly lower than those obtained just before treatment ($P < 0.001$). Similar studies on early interventions for AR also yielded surprising results.[24-26] The mechanism of action may involve the regulation of '*Qi*' and blood and the balance of *Yin* and *Yang*.

In this study, after 4 weeks of early intervention, compared with those of the patients in the SA group, the TNSS and the RQLQ score in week 1 showed significantly greater improvement in the SPG group ($P < 0.001$, respectively). These results imply that early intervention *via* "Xinwu acupoint" stimulation might potentially excite the sympathetic nerves and inhibit the parasympathetic nerves, leading to a balance in the sympathetic and parasympathetic tones.

The results of this study confirm that early acupuncture can effectively improve the symptoms of SAR and the quality of life of patients. However, the exact mechanism of the effect of SPG acupuncture still needs to be investigated in our future work.

The proposed trial has several methodological limitations. First, the sample size in this study was relatively small. Next, the acupuncturists and participants could not be completely blinded because of the differences in acupuncture techniques and control required while needling. However, the acupuncturists were trained to not communicate the therapeutic procedures and responses to the participants and outcome assessors. Furthermore, we were unable to determine whether the observed efficacy was caused by placebo effects, the intensity of provider contact, or the physiological effects of needling. Additionally, the bias resulting from the lack of blinding cannot be totally excluded. Finally, acupuncture is an invasive treatment, and patients with severe symptoms had better adherence to early intervention. Therefore, almost all the participants in our study suffered from severe allergic

rhinitis with a long duration. However, most patients with SAR have mild symptoms. Therefore, the effect of early acupuncture intervention on patients with mild SAR requires further study.

In conclusion, although early supplementary acupuncture may improve SAR, the addition of acupuncture to the sphenopalatine ganglion (Xinwu acupoint) is more effective in ameliorating nasal symptoms and improving the quality of patients' daily lives.

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6. REFERENCES

1. ISAAC Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. Lancet 1998; 351: 1225-32.
2. Wang R, Zhang H. Two hundred thousands results of allergen specific IgE detection. Chin J Allergy Clin Immunol 2016; 1673-8705: 01-0018-06.
3. Guan K, Wang L. Overall diagnosis and treatment strategy for allergic diseases related to hay fever. J Otolaryngol Ophthalmol Shandong Univ 2019; 33: 13-9.
4. Camelo-Nunes IC, Sole D. Allergic rhinitis: indicators of quality of life. J Bras Pneumol 2010; 36: 124-33.
5. Brozek JL, Bousquet J, Baena-Cagnani CE, et al. Allergic rhinitis and its impact on asthma (ARIA) guidelines: 2010 revision. J Allergy Clin Immunol 2010; 126: 466-76.
6. Edwards IR, Aronson JK. Adverse drug reactions: definitions, diagnosis, and management. Lancet 2000; 356: 1255-59.
7. Lingjaerde O, Ahlfors UG, Bech P, Dencker SJ, Elgen K. The UKU side effect rating scale. A new comprehensive rating scale for psychotropic drugs and a cross-sectional study of side effects in neuroleptic-treated patients. Acta Psychiatr Scand Suppl 1987; 334: 1-100.
8. Schafer T, Riehle A, Wichmann HE, et al. Alternative medicine in allergies- prevalence, patterns of use, and costs. Allergy 2002; 57: 694-700.
9. Passalacqua G, Bousquet PJ, Carlsen KH, et al. ARIA update: I–Systematic review of complementary and alternative medicine for rhinitis and asthma. J Allergy Clin Immunol 2006; 117: 1054-62.
10. Krouse JH, Krouse HJ. Patient use of traditional and complementary therapies in treating rhinosinusitis before consulting an otolaryngologist. Laryngoscope 1999; 109: 1223-7.
11. Xue CC, An X, Cheung TP, et al. Acupuncture for persistent allergic rhinitis: a randomised, sham-controlled trial. Med J Aust 2007; 187: 337-41.
12. Paterson C, Britten N. Acupuncture as a complex intervention: a holistic model. J Altern Complement Med 2004; 10: 791-801.
13. Brinkhaus B, Witt CM, Jena S, et al. Acupuncture in patients with allergic rhinitis: a pragmatic randomized trial. Ann Allergy Asthma Immunol 2008; 101: 535-43.
14. Goh YL, Liu J, Zhao B. Use of the layer analysis method of the yellow emperor's inner classic in modern society. J Acupunct Meridian Stud 2014; 7: 331-36.
15. Hon KL, Fung CK, Leung AK, Lam HS, Lee SL. Recent patents of complementary and alternative medicine for allergic rhinitis. Recent Pat Inflamm Allergy Drug Discov 2015; 9: 107-19.
16. Wang J, Li Y, Ni C, et al. Cognition research and constitutional classification in Chinese medicine. Am J Chin Med 2011; 39: 651-60.
17. Fan YY, Xi L, Wang XD, et al. Exploration of the constitutional characteristics of Traditional Chinese Medicine in Biqiu. World J Integr Tradit West Med 2013; 8: 388-92.
18. Jiang F, Ma WH, Li KQ. Study on Traditional Chinese Medicine constitution in patients with seasonal allergic rhinitis. Zhong Guo Zhong Yi Ji Chu Yi Xue Za Zhi 2008; 14: 528-9.
19. Gong SK, Gao D, Li SB. Analysis of Traditional Chinese Medicine constitution of 1197 cases of allergic rhinitis. J Emerg Tradit Chin Med 2018; 27: 2176-8.
20. Zhang L, Li L, Shi DZ, et al. Sphenopalatine ganglion stimulation with one acupuncture needle for moderate-severe persistent allergic rhinitis: study protocol for a multicenter randomized controlled trial. Trials 2015; 16: 183.
21. Wang K, Chen L, Wang Y, et al. Sphenopalatine ganglion acupuncture improves nasal ventilation and modulates autonomic nervous activity in healthy volunteers: a randomized controlled study. Sci Rep 2016; 6: 29947.
22. Golding-Wood PH. Observations on petrosal and vidian neurectomy in chronic vasomotor rhinitis. J Laryngol Otol 1961; 75: 232-47.
23. Li XW, Tian ZP. A preliminary summary of the treatment on rhinitis puncturing sphenopalatine ganglion. Beijing Zhong Yi Za Zhi 1990; 9: 36-8.
24. Sasaki K, Okamoto Y, Yonekura S, et al. Cedar and cypress pollinosis and allergic rhinitis: quality of life effects of early intervention with leukotriene receptor antagonists. Int Arch Allergy Immunol 2009; 149: 350-8.
25. Von Berg A, Filipiak-Pittroff B, Schulz H, et al. Allergic manifestation 15 years after early intervention with hydrolyzed formulas--the GINI Study. Allergy 2016; 71: 210-9.
26. Qi S, Chen H, Huang N, et al. Early intervention improves clinical responses to house dust mite immunotherapy in allergic rhinitis patients. Int Arch Allergy Immunol 2016; 171: 234-40.
27. Mullol J, Valero A, Alobid I, et al. Allergic Rhinitis and its Impact on Asthma update (ARIA 2008). The perspective from Spain. J Investig Allergol Clin Immunol 2008; 18: 327-34.
28. Dreborg S, Frew A. Position paper allergen standardization and skin tests. Allergy 1993; 48: 48-82.
29. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi Bian Ji Wei Yuan Hui. Diagnosis and treatment of allergic rhinitis and a recommended scheme (2004 Lanzhou). Zhong Hua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi 2005; 4: 166–7.
30. Juniper EF, Thompson AK, Ferrie PJ, et al. Development and validation of the mini rhinoconjunctivitis quality of life questionnaire. Clin Exp Allergy 2000; 30: 132-40.