

# Integrative Approach to Rhinosinusitis: An Update



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## KEYWORDS

- Rhinosinusitis • Sinusitis • Integrative medicine • Traditional Chinese medicine
- Complementary medicine • Herbal medicine • Acupuncture

## KEY POINTS

- Dietary recommendations for RS: ginger, quercetin, green tea, horseradish.
- Herbal supplements: Pelargonium sidoides, Sinupret, Sinfrontal, Bromelain, Cineole, and others- Traditional Chinese Medicine: acupuncture, acupressure, Chinese herbal medicine.
- Lifestyle recommendations: minimize exposure to environmental toxins, adequate hydration, steam inhalation, avoidance of dairy/refined sugars/processed food, regular exercise, good sleep quality, stress management.

## OVERVIEW

The causes of rhinosinusitis (RS) include infectious and allergic components, and environmental, general host, and local anatomic factors. Psychiatric conditions, such as depression, are also significant factors in the outcomes of patients with chronic RS.<sup>1,2</sup> Current standard conventional management of RS commonly uses multiple therapeutic modalities to break the cycle of chronic disease. However, to date, there is no consensus as to the optimal treatment algorithm for patients with chronic RS.<sup>3</sup> Success in the treatment of chronic RS, unlike in acute RS, is variable and prone to relapse. Therefore, it is important to find other safe and effective treatments for RS.

Although there has been an explosion in the use of complementary medicine over the last few decades,<sup>4–6</sup> surveys have also demonstrated that there is a parallel amount of interest in the use of such modalities specifically for the treatment of RS in the United States<sup>7–11</sup> and internationally.<sup>12–14</sup> This seems to be true along the entire continuum of care for RS, whether before seeing an otolaryngologist or after

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aggressive medical and surgical therapy. There is also a wide range of therapies sought, including acupuncture, herbal medicine, and various supplements.

This article focuses on an integrative approach to RS and serves as an update to our original article published in 2013.<sup>15</sup>

## DIAGNOSIS

RS is categorized by duration of symptoms: acute (up to 4 weeks), subacute (4–12 weeks), and chronic (more than 12 weeks). Acute RS is further categorized into viral RS or acute bacterial RS, with four or more episodes per year described as recurrent acute bacterial RS.<sup>16–19</sup>

## INTEGRATIVE TREATMENT APPROACHES

### *Pelargonium sidoides* EPs 7630

In South Africa, *Pelargonium sidoides* has historically been used to treat a variety of ailments including upper respiratory tract infections, such as bronchitis.<sup>20</sup> *P. sidoides*, traditionally known as Umckaloabo, is rich in phenols and flavonoids.<sup>21–23</sup> It has been standardized in Germany as an aqueous ethanolic extract of its root known as EPs 7630 and has been shown to have antibacterial, antiviral, and immunomodulatory effects.<sup>24–27</sup>

Bachert and colleagues,<sup>28</sup> in a multicenter, double-blinded randomized controlled trial (DBRCT) comparing EPs 7630 with placebo involving 103 patients with sinonasal symptoms of at least 1 week and radiographically and clinically confirmed acute RS, demonstrated superior efficacy and tolerance of EPs 7630 based on changes in Sinusitis Severity Scores. A Cochrane review in 2013 concluded that *P. sidoides* may be effective in alleviating symptoms of acute RS and the common cold in adults, although the overall quality of the evidence was considered to be low.<sup>29</sup> In 2020, another study randomized 50 patients with uncomplicated acute bacterial RS to receive either EPs 7630 or amoxicillin and found that EPs 7630 demonstrated better clinical and antimicrobial efficacy.<sup>30</sup>

### *Bromelain*

Bromelain, a mixture of proteolytic enzymes extracted from pineapples (*Ananas comosus*), has demonstrated anti-inflammatory, antiedematous, antithrombotic, and fibrinolytic effects.<sup>31</sup> Three DBRCTs were conducted in the 1960s on patients with acute and chronic RS, using similar protocols of parallel treatment arms comparing bromelain with placebo, with each group also receiving conventional medical management consisting of antibiotics, decongestants, antihistamines, and analgesics.<sup>32–34</sup> A meta-analysis showed a small, but statistically significant difference in favor of adjunctive treatment with bromelain for nasal mucosal inflammation, nasal discomfort, breathing difficulty, and overall rating, but not for nasal discharge.<sup>35</sup>

A recent multicenter trial enrolling children younger than 11 years of age with acute sinusitis had three treatment groups (bromelain vs bromelain + standard therapy vs standard therapy) and showed a statistically significant recovery time with bromelain monotherapy compared with the other treatment groups.<sup>36</sup> Only one mild self-limiting allergic reaction was noted.

Bromelain has been shown to have excellent penetration into the blood and sino-nasal mucosa in patients with chronic RS.<sup>37</sup> Caution must be used when prescribing bromelain for patients already on anticoagulants because of the increased risk of bleeding and various antibiotics, such as penicillin and tetracycline, because bromelain is also known to promote their absorption.<sup>31</sup> Moreover, bromelain strongly inhibits

human cytochrome P-450 2C9 (CYP2C9) activity and can thereby affect metabolism of its substrates.<sup>38</sup> Recommended doses range from 500 to 2000 mg per day.<sup>39</sup>

### **Cineole**

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Cineole, or more specifically 1,8-cineole, is a monoterpene present in many plant-based essential oils and is commonly derived from *Eucalyptus globulus*. It has been shown to reduce mucus production, block inflammation through inhibiting cytokines tumor necrosis factor (TNF)- $\alpha$  and interleukin (IL)-1 $\beta$ , and produce antinociceptive effects.<sup>40–42</sup>

A prospective DBRCT comparing cineole (200 mg three times per day) with placebo in 152 patients with acute nonpurulent RS, showed a statistically significant difference in symptoms-sum-scores in the cineole group, in addition to a reduction in secondary symptoms, such as headache on bending, frontal headache, nasal obstruction, and nasal secretion.<sup>43</sup> Mild side effects included heartburn and exanthem. The authors concluded that cineole may serve as an alternative therapy during the first 4 days of acute RS, but antibiotics should be initiated if symptoms persist. In addition, another DBRCT demonstrated that cineole was more effective than an herbal preparation containing five different ingredients in the treatment of acute viral RS.<sup>44</sup>

### **Cod Liver Oil**

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Cod liver oil, which is rich in omega-3 fatty acids and vitamin D, has historically been used as a remedy for rickets in the 1800s.<sup>45</sup> There is limited evidence for use of cod liver oil for RS, including a 4-month, open-label study enrolling four children with recurrent chronic RS who were given escalating doses of cod liver oil and a multivitamin with selenium.<sup>46,47</sup> Three subjects demonstrated a positive response with decreased sinus symptoms, reduced episodes of acute sinusitis, and fewer physician visits.

### **Manuka Honey**

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Manuka honey is produced from the nectar of flowers native to Australia and New Zealand, particularly from species of *Leptospermum*, and may potentially modulate expression of multiple cytokines, including IL-6, IL-8, IL-13, and macrophage inflammatory protein-1 $\beta$ .<sup>48</sup> It was found to have bactericidal activity against biofilms formed by *Pseudomonas aeruginosa* and *Staphylococcus aureus*.<sup>49–51</sup>

Manuka honey may also help generate nitric oxide to produce a potent antibiofilm effect in patients with chronic RS.<sup>52</sup>

Thamboo and colleagues<sup>53</sup> studied the use of a topical combination of manuka honey and saline in 34 patients with allergic fungal RS who were treated for 1 month. Although there was symptomatic improvement on the Sino-Nasal Outcome Test (SNOT)-20 as an outcome measure, culture results from their ethmoid cavities were unchanged, as was their endoscopic staging.

A prospective randomized controlled trial (RCT) compared manuka honey with saline sinus irrigation for patients with active chronic RS and prior sinus surgery and did not find any significant difference between the two groups; however, among those who were not treated with antibiotics/steroids, manuka honey alone was found to be statistically better on culture negativity suggesting possible effectiveness for acute exacerbations of chronic RS.<sup>54</sup> Another RCT demonstrated that manuka honey with augmented methylglyoxal sinonasal rinses was not superior to culture-directed antibiotic therapy and twice-daily saline rinses.<sup>55</sup> For cystic fibrosis-associated chronic RS, a pilot study showed that manuka honey achieved a clinically important difference in quality of life (QoL) score and significantly better endoscopic outcome compared with saline sinus irrigation.<sup>56</sup>

### **Sinupret**

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Sinupret is comprised of *Gentianae radix*, *Primulae flos*, *Rumex herba*, *Sambuci flos*, and *Verbena herba*, and was approved by the German Commission E in 1994 for the treatment of acute and chronic inflammation of the paranasal sinuses.<sup>57</sup>

Sinupret has been shown to have in vitro antiviral activity and can strongly stimulate transepithelial Cl<sup>-</sup> secretion to maintain normal mucociliary clearance in sinonasal epithelium through hydration of the airway surface liquid.<sup>58,59</sup>

Three RCTs evaluated Sinupret as adjunctive therapy for acute RS and one RCT for chronic RS.<sup>60–63</sup> A systematic review demonstrated that Sinupret may be effective as an adjunctive therapy in acute RS.<sup>35</sup> In 2015, a prospective, multicenter study supported these findings for acute RS and determined that treatment with Sinupret was safe.<sup>64</sup> However, for chronic RS, an RCT in 2017 did not find a significant difference between Sinupret (BNO 1016) and placebo, although there were trends toward improvement for secondary end points.<sup>65</sup> Another study found no significant difference in olfactory function between patients treated with Sinupret versus placebo, although an initial therapy of oral prednisolone for 1 week had preceded the treatment intervention.<sup>66</sup> For children 6 to 11 years of age, a multicenter randomized trial published in 2020 found Sinupret (BNO 1012) to be effective for treating acute RS and reduced the need for antibiotics, when given in addition to standard therapy.<sup>67</sup>

### **Esberitox**

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Esberitox is an herbal extract containing *Thuja occidentalis* (white cedar), *Echinacea purpurea/pallida* (purple coneflower), and *Baptisia tinctoria* (wild indigo) with demonstrated immunomodulatory properties.<sup>68</sup> A placebo-controlled DBRCT showed a dose-dependent efficacy in the treatment of upper respiratory infections and, in particular, certain symptoms, such as rhinorrhea.<sup>69</sup> Another study that enrolled 90 patients with acute RS compared (1) Esberitox and doxycycline, (2) Sinupret and doxycycline, and (3) doxycycline alone, and found that both groups with combination therapies had a significantly higher rate of response.<sup>35,63</sup> Reported adverse events included photosensitivity and gastrointestinal symptoms, such as nausea.

### **Myrtol**

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Myrtol is a standardized phytotherapeutic extract (GeloMyrtol/GeloMyrtol Forte), taken from *Pinus* spp, *Citrus aurantiifolia*, and *E globulus*, and is mainly comprised of three monoterpenes: (+) alpha-pinene, D-limonene, and 1,8-cineole. It has been shown to inhibit 5-lipoxygenase activity, leukotriene C<sub>4</sub>, and prostaglandin E<sub>2</sub>.<sup>70</sup>

In a multicenter DBRCT, 330 patients with acute sinusitis were enrolled into one of three arms: (1) Myrtol extract (300 mg per day), (2) other unidentified essential oil, or (3) placebo.<sup>71</sup> Myrtol and the other essential oil groups demonstrated superior efficacy to placebo based on the total symptom score, although there was insufficient statistical data to support this conclusion.<sup>35</sup> Another prospective, multicenter trial demonstrated that Myrtol (ELOM-080) led to a faster recovery of facial pain in patients with acute RS, when compared with Sinupret (BNO 1016).<sup>72</sup> Mild to moderate reported adverse events were mostly gastrointestinal in nature.

### **Cyclamen europaeum**

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*Cyclamen europaeum* is a member of the primrose family and has been used in southeastern Europe as a traditional remedy for acute RS. In 2019, a Cochrane review that included two placebo-controlled DBRCTs and a total of 147 adult patients with acute RS confirmed by radiology or nasal endoscopy, concluded that the effectiveness of C

*europaeum* is unknown, but there was moderate-quality evidence of reported mild adverse effects (nasal/throat irritation, epistaxis, sneezing) in up to 50% of participants.<sup>73–75</sup>

### ***Nasturtium and Horseradish Root***

*Nasturtium* (*Tropaeoli majoris herba*) and horseradish root (*Armoraciae rusticanae radix*) have broad antimicrobial activities against multiple gram-positive and gram-negative bacteria, including *Haemophilus influenzae*, *Moraxella catarrhalis*, *P. aeruginosa*, *S. aureus*, and *Streptococcus pyogenes*.<sup>76</sup>

A prospective, multicenter study performed in children between 4 and 18 years of age with acute RS found that an herbal drug preparation, containing nasturtium and horseradish root, had similar efficacy and fewer adverse events compared with standard antibiotics.<sup>77</sup>

### **NUTRITION: GINGER, QUERCETIN, AND EPIGALLOCATECHIN GALLATE**

Dietary polyphenols are widely available in food and well-known for their anti-inflammatory effects. Both ginger and quercetin, a polyphenolic bioflavonoid commonly found in apples and onions, have potent antioxidant and anti-inflammatory properties.<sup>78,79</sup> Quercetin has been shown to suppress the inflammatory mediator cyclooxygenase-2, inhibit histamine release through downregulation of mast cell activity and enhance mucociliary clearance through augmented transepithelial chloride secretion via the cystic fibrosis transmembrane conductance regulator anion channel.<sup>80–82</sup>

A combination of ginger extract and green tea (*Camellia sinensis*), which is rich in epigallocatechin gallate, demonstrated significant anti-allergy effects through suppression of TNF- $\alpha$  and macrophage inflammatory protein-1 $\alpha$ .<sup>83</sup> The dietary polyphenols of [6]-gingerol, quercetin, and epigallocatechin gallate were found to effectively inhibit excess mucus secretion of respiratory epithelial cells while maintaining normal nasal ciliary movement.<sup>84</sup>

### **HOMEOPATHY**

Homeopathy is based on the principle of similars (“like cures like”) whereby therapeutic effects are achieved by stimulating the body’s homeostatic healing response via substances that have been serially diluted and shaken. There is evidence from RCTs that homeopathy may be effective for the treatment of influenza and allergies.<sup>85</sup> In a prospective observational trial from Germany, 134 adult patients with refractory chronic RS were treated with different homeopathic remedies and found to have sustained improvements in QoL outcomes (Short Form-36) with decreased use of conventional medications, especially during the first 3 months of follow-up.<sup>86</sup>

### ***Sinfrontal***

*Sinfrontal* is a homeopathic remedy (containing Cinnabaris D4, Ferrum phosphoricum D3, Mercurius solubilis D6) commonly used in Germany for a variety of upper respiratory tract infections. A multicenter DBRCT comparing *Sinfrontal* with placebo in 113 patients with radiography-confirmed acute maxillary sinusitis found that there was a significant difference in patients treated with *Sinfrontal* with no recurrence of symptoms 8 weeks posttreatment.<sup>87</sup> An economic analysis demonstrated that *Sinfrontal* can lead to substantial cost savings with markedly reduced absenteeism from work.<sup>88</sup>

## TRADITIONAL CHINESE MEDICINE

Traditional Chinese medicine (TCM) is a whole medical system that has been used for several millennia and incorporates certain therapies, such as acupuncture and Chinese herbal medicine. Specifically, the use of TCM for the treatment of disorders involving the ears, nose, and throat is traced back as early as the fifth century BC with several therapies that may be beneficial for RS.<sup>89</sup>

### Acupuncture

The therapeutic effects of acupuncture primarily involve modulation of several physiologic cascades, including the inflammatory response, immune system, autonomic nervous system, neuroendocrine axis, limbic system, or pain pathway.<sup>90–95</sup> Although acupuncture may regulate many of these cascades in patients with RS, specific effects of improved mucociliary clearance and airway surface liquid have also been demonstrated.<sup>96</sup> In a placebo-controlled DBRCT, acupuncture was used to treat patients with nasal congestion and hypertrophic inferior turbinates and was found to have significant improvement on visual analog scale and nasal airflow as measured by active anterior rhinomanometry.<sup>97</sup> Another study demonstrated a 60% reduction in sinus-related pain compared with only 30% in the placebo group.<sup>98</sup> Acupuncture also showed beneficial results among children who were treated for chronic maxillary sinusitis.<sup>99</sup>

A research team in Norway performed two different studies using a similar protocol, which included 65 patients with chronic RS who were randomized into three cohorts: (1) traditional Chinese acupuncture; (2) sham acupuncture; or (3) conventional management with antibiotics, steroids, nasal saline irrigation, and local decongestants.<sup>100,101</sup> In both studies, health-related QoL symptom scores improved in all three groups, although there was no statistically significant difference among them. In 2020, a systematic review found acupuncture to have a moderate to high GRADE (Grading of Recommendations, Assessment, Development and Evaluations) rating.<sup>102</sup>

### Chinese Herbal Medicine

*Xanthii fructus* (Chinese herbal name: Cang Er Zi) and *Flos magnoliae* (Chinese herbal name: Xin Yi Hua) are commonly used herbs in TCM to treat RS. From a TCM perspective, *X fructus* “disperses wind and dampness” to remove thick, viscous nasal discharge and sinus-related headaches, whereas *F magnoliae* “expels wind-cold” to treat nasal discharge, hyposmia, sinus congestion, and headaches.<sup>103</sup> In fact, these two herbs are typically combined as key components of the Chinese herbal preparations, Cang Er Zi Wan and Cang Er Zi San, which are the pill and powder formulations, respectively.<sup>104</sup>

It is important to emphasize that Chinese herbs should be used according to TCM theory. If not, severe adverse events can occur. One notable example was the inappropriate use of Ephedra (Chinese name: Ma Huang) for weight loss, increased energy, and performance enhancement, which traditionally is taken only for brief amounts of time to treat upper respiratory infections, much like how pseudoephedrine is used only temporarily for such symptoms.<sup>105</sup>

### *Xanthii fructus* (Chinese name: Cang Er Zi)

*X fructus* was found to exhibit (1) anti-inflammatory effects by inhibiting interferon- $\gamma$ , TNF- $\alpha$ , and lipopolysaccharide-induced nitric oxide synthesis; (2) antiallergic effects via blocking mast cell-mediated histamine release; and (3) antioxidant effects through increased activities of catalase, superoxide dismutase, and glutathione peroxidase in the liver.<sup>106–108</sup> *X fructus* is also known as *Xanthium strumarium* because the former is

the fruit of the latter. Specific components of *X strumarium* displayed antibacterial, antiviral, antifungal, anti-inflammatory, antioxidant, and antiallergic effects.<sup>109</sup>

A DBRCT divided 126 patients into equal cohorts receiving either Shi-Bi-Lin (a modified version of the Chinese herbal formula Cang Er Zi San) or placebo, and found that Shi-Bi-Lin significantly improved symptoms with a sustained response for at least 2 weeks.<sup>110</sup> However, caution must be exercised when using either *X fructus* or Cang Er Zi Wan, because they have been shown to lead to certain side effects, such as muscle spasm and hepato- and nephrotoxicity.<sup>111,112</sup>

#### ***Flos magnoliae* (Chinese herbal name: Xin Yi Hua)**

The primary bioactive components of *F magnoliae* include neolignans, epimagnolin, and fargesin.<sup>113</sup> Neolignans have been found to have anti-inflammatory effects through mechanisms of action different from steroids, whereas epimagnolin and fargesin decrease production of nitric oxide, a potent mediator in inflammation.<sup>114,115</sup> *F magnoliae* also demonstrates antiallergy activity through inhibition of immediate-type hypersensitivity reactions and blockade of mast cell degranulation.<sup>116</sup>

A study in Taiwan found that 29% of 14,806 patients with chronic RS had used TCM, in addition to conventional Western treatment, and found that a lower proportion of these patients underwent endoscopic sinus surgery compared with those who did not receive TCM. The most commonly used Chinese herbal formula was Xin-Yi-Qing-Fei-Tang, which contains *F magnoliae*.<sup>117</sup>

#### **Chinese Herbal Supplements (Postoperative)**

Bi Yuan Shu is a Chinese herbal liquid mixture composed of several herbs, including *Magnolia liliiflora*, *X strumarium*, *Astragalus membranaceus*, *Angelica dahurica*, and *Scutellaria baicalensis*. A multicenter RCT randomized 340 postoperative patients with chronic RS and nasal polyps who had undergone endoscopic sinus surgery into two groups with both receiving antibiotics and topical steroids, whereas the test group was also treated with Bi Yuan Shu.<sup>118</sup> Adjunctive treatment with Bi Yuan Shu was found to have significant improvement of purulent nasal discharge, breathing difficulty, pain, hyposmia, and halitosis for up to 2 months, with positive trends noted for fever and cough.<sup>35</sup>

Another study that examined the use of Chinese herbal medicine in patients who had received endoscopic sinus surgery, enrolled 97 patients into one of three treatment arms: (1) Tsang Erh San extract granules and Houத்துynia extract powder, (2) oral amoxicillin, or (3) placebo; and found no benefit of either treatment group over placebo.<sup>119</sup>

A subsequent study by the same research group, however, showed that Tsang Erh San and Houத்துynia had similar efficacy to erythromycin in the treatment of patients with chronic RS without nasal polyps.<sup>120</sup>

### **MULTIMODAL APPROACHES**

A multicenter, nonrandomized study of 63 patients with acute RS compared multiple conventional (antibiotics, secretolytics, and sympathomimetics) versus combination complementary (Sinupret and homeopathic remedy, Cinnabaris 3X) therapies and demonstrated similar effectiveness based on patients' self-assessment score, physicians' score, and HCG-5 questionnaire.<sup>121</sup> However, the only validated outcome measure was the HCG-5 QoL instrument. Other limitations with this study included a small sample size and lack of randomization and blinding.

A pilot study at UCLA was conducted using integrative East-West medicine to treat patients with recalcitrant chronic RS.<sup>122</sup> Eleven patients received eight weekly sessions of acupuncture (Table 1) and therapeutic acupressure-style massage, along

**Table 1**  
**Acupuncture and acupressure point locations and indications**

Acupuncture Point Locations and Indications		
Name	Location	Purpose
<b>Sinus specific</b>		
LI-4 (He Gu)	On the dorsum of the hand, on the midpoint of the second metacarpal bone, near its radial border	Nasal congestion, rhinorrhea, headache, "wind-cold" TCM pattern, neck pain, facial pain, stress
GB-20 (Fang Chi)	Near the base of skull, in the depression between the origins of the sternocleidomastoid and trapezius muscles	Nasal congestion, rhinorrhea, headache, "wind-cold" TCM pattern
ST-3 (Ju Liao)	Lateral to the nasolabial groove, level with the lower border of the ala nasi, directly inferior to the midpoint of the eye	Pain and swelling involving the maxillary sinus
LI-20 (Ying Xiang)	In the nasolabial groove, at the level of the midpoint of the lateral border of the ala nasi	Nasal congestion, rhinorrhea, anosmia
UB-2 (Zan Zhu)	Superior to the inner canthus, in a depression at the medial border of the eyebrow	Rhinitis, pain and swelling of the frontal sinus, frontal headache, "wind" TCM pattern
DU-23 (Shang Xing)	At the top of the head on the midline, 1 finger breadth posterior to the anterior hairline	Nasal obstruction and discharge, headache, rhinitis
<b>Quality-of-life improvement</b>		
LI-11 (Qu Chi)	With the elbow flexed, at the lateral end of the transverse cubital crease	Loss of voice, sore throat, "heat" TCM pattern
SJ-5 (Wai Guan)	3 finger breadths proximal to the wrist crease, on the radial side of the extensor digitorum communis tendons	Headache, neck pain, "wind-heat" TCM pattern
GB-21 (Jian Jing)	Midway between the spinous process of C7 and the tip of the acromion, at the highest point trapezius muscle	Neck pain, cough, phlegm
P-6 (Nei Guan)	3 finger breadths proximal to the wrist crease in between the tendons of the palmaris longus and flexor carpi radialis	Anxiety, pain of the head and neck, cough
ST-36 (Zu San Li)	With the knee extended, 4 finger breadths below the patella, just lateral to the tibia within the tibialis anterior muscle	Fatigue, vitality
LIV-3 (Tai Chong)	On the dorsum of the foot, in the depression distal to the junction of the first and second metatarsal bones	Headache, insomnia, stress, irritability

Adapted from: Suh JD, Wu AW, Taw MB, Nguyen C, Wang MB. Treatment of Recalcitrant Chronic Rhinosinusitis with Integrative East-West Medicine: A Pilot Study. *Arch Otolaryngol Head Neck Surg.* 2012 Mar;138(3):294-300.



with dietary modification, lifestyle changes, and self-acupressure. Four items on the SNOT-20 (need to blow nose, runny nose, reduced concentration, and frustrated/restless/irritable) and three domains on the Short Form-36 (role physical, vitality, and social functioning) showed a statistically significant difference, whereas trends of improvement were noted in most other elements on both QoL instruments. Although the data look promising, this study was also limited by its small size, lack of randomization, and control group.

## PATIENT SELF-TREATMENTS

Lifestyle modifications can also be conducive toward achieving optimal sinus health and function. These include regular aerobic exercise, adequate hydration, steam inhalation, stress management, and good sleep quality. Minimizing exposure to pollution, smoke, and environmental toxins and incorporating nutritional changes, such as consuming an anti-inflammatory diet and avoiding dairy products, refined sugars, and processed foods, are important.<sup>123</sup> A regular spiritual practice, such as prayer, is also beneficial along with anger management and attitudes of forgiveness, gratitude, and optimism.<sup>124</sup> Self-acupressure of certain acupoints can also be helpful to reduce sinus-related symptoms (see [Table 1](#)).

## SUMMARY

As a greater understanding of the complex pathogenesis of RS is gained, what is becoming apparent is a shift in philosophic paradigm. Previous reductionistic models of disease and health are being replaced by holism, systems biology, and complex, nonlinear dynamics.<sup>125–127</sup> Holism is a central philosophic underpinning of complementary/integrative medicine and TCM.

This paradigm shift is now seen in the approach to RS. No longer is the medical community looking at the diagnosis of RS as solely an infectious process, but rather as complex and multifactorial.<sup>128</sup>

The therapeutic repertoire, likewise, has broadened significantly from antibiotics alone as the mainstay of treatment to the use of multiple therapies to act on different pathophysiologic facets of RS. Integrative medicine provides an expanded approach and armamentarium to help patients with RS, whether acute, chronic, or recalcitrant. Although numerous recent papers have been published since our original article in 2013, the evidence and recommendations remain the same.

## CLINICS CARE POINTS

- Dietary recommendations for RS: ginger, quercetin, green tea, horseradish
- Herbal supplements: *Pelargonium sidoides*, Sinupret, Sinfrontal, Bromelain, Cineole, and others
- Traditional Chinese medicine: acupuncture, acupressure, Chinese herbal medicine
- Lifestyle recommendations: minimize exposure to environmental toxins, adequate hydration, steam inhalation, avoidance of dairy/refined sugars/processed food, regular exercise, good sleep quality, stress management

## DISCLOSURE

The authors have no relevant financial interests pertaining to this article.

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