RESEARCH ARTICLE

OSTEOPATHIC MANIPULATIVE TREATMENT FOR SINUSITIS RELIEF: A PILOT STUDY

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KEYWORDS:

Allergy

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Abstract

Introduction: Sinusitis affects more than 30 million Americans each year, with healthcare costs of $11 billion annually. Few studies explore osteopathic manipulative treatment (OMT) as an adjunct therapy for sinusitis. Our study aims to investigate the therapeutic benefits and safety of an OMT sinusitis protocol in relieving symptoms of sinusitis.

Methods: Western University of Health Sciences Institutional Review Board approved the project. A recruitment flyer was sent out to all students from the Western University of Health Sciences College of Osteopathic Medicine of the Pacific (n=445), and 22 subjects with symptoms of sinusitis volunteered to receive OMT. Subjects signed an informed consent form prior to treatment. Treatment was standardized with the same OMT practitioner for a 14-minute OMT sinusitis protocol. Each subject was given a survey to rate the severity of sinusitis symptoms pre- and post-OMT. Symptoms measured included sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue. Data was analyzed using the Wilcoxon signed rank test, with significance determined by $P<0.05$ and a 95% confidence interval.

Results: All 22 subjects reported symptomatic relief of sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue after OMT with each $P<0.05$. All subjects reported an overall improvement in sinus symptoms with OMT. No adverse events of OMT were reported.

Conclusion: This study concludes that an OMT sinusitis protocol serves as a safe and beneficial option for the relief of sinusitis symptoms. The limitations of the study include lack of control group and small sample size. Future studies with a control or sham group with a larger sample size are warranted.

INTRODUCTION

Sinusitis is one of the most common health complaints in the United States, affecting more than 30 million Americans each year and costing $11 billion annually.[1] As reported in the National Health Interview Survey, up to 14.7% of people had sinusitis the preceding year.[2] The etiology of sinusitis is presumed to be a combination of environmental and host factors. While viral upper respiratory infection is the most common cause of sinusitis, with up to 90% of patients with the common cold experiencing viral sinusitis symptoms, it can also be caused by allergens, irritants, fungi and bacteria.[2] Symptoms of sinusitis include nasal congestion, purulent nasal discharge, postnasal drip, facial pain or pressure, fever, fatigue, cough, hyposmia or anosmia, and headache.[3] It has been reported that the symptoms of sinusitis have a significant impact on health-related quality of life, high healthcare provision and significant days lost to industry.[4] The pain and discomfort experienced by patients often make them seek additional adjunct therapies.

Treatments of sinusitis depend on the duration and severity of the symptoms. Primary management for acute sinusitis includes nasal saline irrigation and topical nasal steroids, aiming to provide symptomatic relief. Antihistamines, immunotherapy and avoidance of triggers can also be used to alleviate symptoms of sinusitis. For patients with worsening symptoms or for those who fail to improve after a 7-day observation period, oral antibiotics and oral glucocorticoids are used as second-line therapy. For patients whose symptoms do not improve with these standard medical treatments, endoscopic sinus surgery is recommended.[5]

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Despite the multiple conventional treatment options for sinusitis, many patients continue to suffer from frequent or chronic sinus symptoms and seek alternative therapies to complement traditional modalities.[6]

One alternative therapy includes osteopathic manipulative treatment (OMT). OMT is a variety of manual techniques utilizing palpatory skills to diagnose and treat somatic dysfunction and restore function within the body's framework. It is designed to improve physiological function and to support homeostasis.[7] Complaints of the head, eyes, ear, nose and throat (HEENT) are often encountered in primary care, and previous literature reports that sinusitis is one of the top 15 conditions commonly treated with OMT.[8] Likewise, an informative 1996 report on the use of OMT in an emergency department setting demonstrated sinusitis to be one of the conditions that could be ameliorated or eliminated with OMT.[1] Clinical experience has shown that incorporation of musculoskeletal treatment in the management of HEENT patients improves recovery time and reduces incidence of recurrence and complications.[9,10] When treating sinus infections, OMT has been used to improve fluid drainage from the sinuses, to decrease pain and viscero-somatic and somato-visceral reflexes, and to alter mucus viscosity.[11]

Despite numerous studies reporting benefits of OMT in managing HEENT complaints, there is a paucity of studies exploring OMT as an adjunctive therapy for sinusitis. In this study, the aim is to shed light on OMT as therapy for sinusitis and to assess the safety and benefit of an OMT sinusitis protocol.

METHODS

The study was conducted from November to December 2019 at the Western University of Health Sciences College of Osteopathic Medicine of the Pacific (COMP). Western University Institutional Review Board granted ethics approval for the study.

Recruitment

A flyer was sent out to all osteopathic students at the COMP campus. Inclusion criteria consisted of students who suffered from symptoms of acute or chronic sinusitis at the time of the recruitment. Exclusion criteria included subjects who did not present with symptoms of acute or chronic sinusitis at that time. Written informed consent was obtained from all subjects prior to OMT.

Experimental protocol

BEFORE THE INTERVENTION

Each subject completed surveys to rate the severity of their sinusitis symptoms pre- and post-OMT. The symptoms of sinusitis include sinus congestion (SC), postnasal drip (PND), sinus pain (SP), headache (HA), sense of smell (SM) and fatigue (FA). SC, PND, SP and HA were rated on a 0-to-3 scale with 0=no symptoms, 1=minimal symptoms, 2=moderate symptoms and 3=severe symptoms. SM was rated as 0=unable to smell, 1=intermittent smell and 2=able to smell. FA was rated as 0=not present and 1=present. The overall quality of life with sinus symptoms was rated on a 0-to-10 scale with 0 indicating no interference with daily life and 10 indicating severe interference with daily life.

A single osteopathic physician at Western University of Health Sciences designed and performed an OMT sinusitis protocol for all subjects. The OMT sinusitis protocol lasted approximately 14 minutes per subject. The subject was either prone or supine for the duration of the protocol, with the exception of being seated during the thoracic muscle energy technique.

The protocol included the following techniques performed in the order as listed below from numbers 1 to 8. Each technique lasted, on average, 2 minutes. The high-velocity, low-amplitude techniques and Chapman points technique took 1 minute each. The sphenopalatine ganglion release took 3 minutes to complete. Myofascial release; muscle energy; and high-velocity, low-amplitude techniques were performed based on the somatic dysfunctions found by the physician.

1. **Cervical soft tissue technique:** The investigator palpated the paravertebral musculature of the cervical spine with second and third finger pads of both hands. Anterior, lateral and superior half-circles were formed with moderate pressure until a softening was felt by the investigator. This was repeated for the entire cervical region.

2. **Cervical myofascial release technique:** The investigator contacted the suboccipital muscle masses bilaterally with the second and third finger pads of both hands and applied superior traction until resistance was felt. The investigator held the traction until a release was felt.

3. **Cervical high-velocity, low-amplitude technique:** The occipitoatlantal (OA) joint and C2–C7 vertebrae were evaluated in the 3 motions of flexion/extension, sidebending and rotation. The atlantoaxial (AA) joint was evaluated in only rotation. For subjects with OA somatic dysfunction, the investigator locked out the OA joint in all 3 planes of restriction and applied a quick sidebending thrust toward the subject's contralateral eye. For the AA joint and C2–C7 vertebrae, the investigator locked out the affected segment in all planes of restriction and applied a quick rotational thrust.

4. **Thoracic muscle energy technique:** Using the head as a lever, the investigator monitored the restricted upper thoracic spinous processes with one hand. With his other hand, he contacted the superior aspect of the subject's head and slowly brought it into the restriction of all 3 flexion/extension, sidebending and rotation motions. The subject was then instructed to contract their head back to neutral position for 5 seconds against the investigator's unyielding counterforce. The subject was then told to relax so the investigator could passively take the subject's head to its new restrictive barrier. This process was repeated 3 times.

5. **Scapular release technique:** The investigator contacted the medial border of the scapula with his hand closer to the subject's head while using his other hand to contact the subject's forearm to induce internal rotation of the shoulder to provide better grip on the medial border of the scapula. Lateral traction was applied at the medial border of the scapula until resistance was felt. The investigator held the traction until a release was felt. This technique was repeated on the contralateral side.

6. **Thoracic high-velocity, low-amplitude technique:** T1–T4 segments were evaluated for somatic dysfunction. Rotating the subject toward him, the investigator placed his thenar eminence on the subject's posterior transverse process and rolled the subject to the supine position over his thenar eminence. The investigator then placed the subject's elbow into his epigastrium, localizing his weight over his thenar eminence. With his other hand, the investigator flexed the subject's head and sidebent it into its restriction to the level of the dysfunctional segment. The subject was instructed to inhale and exhale as the investigator increased localization to the segment by applying his weight. For flexed segments, a quick thrust was applied directly along the subject's anterior-posterior axis from the investigator's epigastrium to his thenar eminence. For extended segments, the thrust was applied 45° superior to the subject's anterior-posterior axis from the investigator's epigastrium to his thenar eminence.

7. **Chapman points technique:** Nodular hypertonic spheres located in the first intercostal space adjacent to the sternum were located bilaterally and massaged with the second finger pads for 30 seconds.

8. **Intra-oral sphenopalatine ganglion release technique:** Using a gloved hand, the investigator slid his fifth finger inside the oral cavity along the lateral surface of the maxilla until coming into contact with the flat surface of the lateral pterygoid plate. The tip of the finger was turned upward on the lateral plate, and gentle pressure was applied until softening was felt. This process was repeated on the contralateral side.

AFTER THE INTERVENTION

Each subject completed a post-OMT survey identical to the pre-OMT survey. Statistical analysis was performed using the Wilcoxon signed rank test (SPSS, version 27.0; IBM SPSS). Significance was established at $P<0.05$.

RESULTS

A total of 22 subjects who had symptoms of sinusitis were included in the study. No subjects were excluded from the study. The median age was 25 years old, and 12 subjects (55%) were women. The duration of symptoms ranged from 2 to 56 days. Subjects presented with symptoms of sinusitis secondary to upper respiratory infections (n=10), chronic sinusitis (n=7), allergies (n=4) and unknown (n=1). Out of 22 subjects, 12 treated their sinusitis symptoms with traditional treatment modalities, including decongestants (n=11), antihistamines (n=8), saline irrigation (n=4) and antibiotics (n=1). Ten of 22 subjects were not using any treatments for their sinusitis symptoms. These findings are shown in **Table 1**.

All subjects reported relief of sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue after OMT ($P<0.05$). These findings are demonstrated in **Table 2**.

TABLE 1:

Background information (n=22)

		N	%
Gender	Male	10	45.5%
	Female	12	54.5%
Reason for sinus symptoms	Upper respiratory infection	10	45.5%
	Chronic sinusitis	7	31.8%
	Allergies	4	18.2%
	Unknown	1	4.5%
Treatment	Decongestant	11	50.0%
	Antihistamines	8	36.4%
	Saline irrigation	4	18.2%
	Antibiotics	1	4.5%
Duration of symptoms	Range, days	2–56	

TABLE 2:

Changes in symptoms of sinusitis pre-OMT and post-OMT (n=22)

	CHANGES IN SYMPTOM SEVERITY, MEAN (SD)		
Symptom	Pre-OMT	Post-OMT	*P* value
Sinus congestion (SC)[a]	1.36 (0.79)	0.64 (0.66)	0*
Postnasal drip (PND)[a]	1.5 (0.96)	0.86 (0.71)	0.003*
Sinus pain (SP)[a]	1.50 (1.47)	0.68 (0.95)	0.002*
Headache (HA)[a]	1.95 (2.04)	0.82 (1.50)	0.002*
Smell (SM)[b]	1.32 (0.84)	1.73 (0.55)	0.024*
Fatigue (FA)[c]	0.64 (0.49)	0.36 (0.49)	0.014*

[a]Symptom scale scores were 0 to 3 with 0= no symptom, 1= minimal symptoms, 2= moderate symptom, 3= severe symptom

[b]Symptom scale scores were 0= unable to smell, 1= intermittent smell, 2= smell

[c]Symptom scale scores were 0= not present, 1= present

*Statistically significant <0.05

All subjects reported an overall improvement in symptoms of sinusitis following OMT. Immediately after OMT, 4 out of 22 subjects reported minimal relief, 16 out of 22 subjects reported moderate relief, and 2 out of 22 subjects reported complete resolution of overall sinus symptoms. The subjects also reported reduction in interference of sinus symptoms with daily life after OMT ($P<0.05$). No adverse effects of OMT were reported.

FIGURE 1:

Subjective reporting of overall improvement in sinus symptoms with OMT

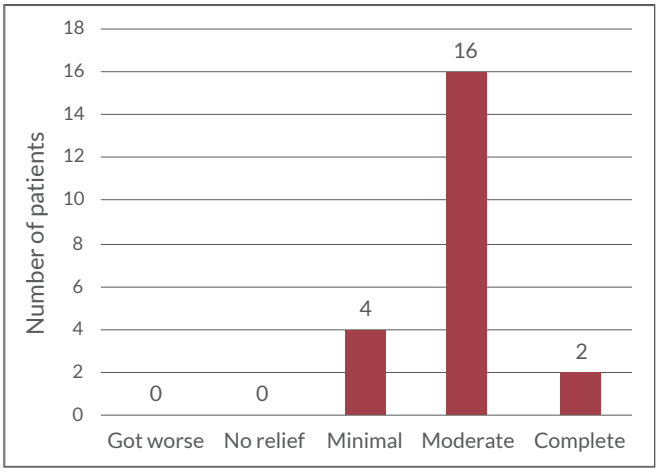
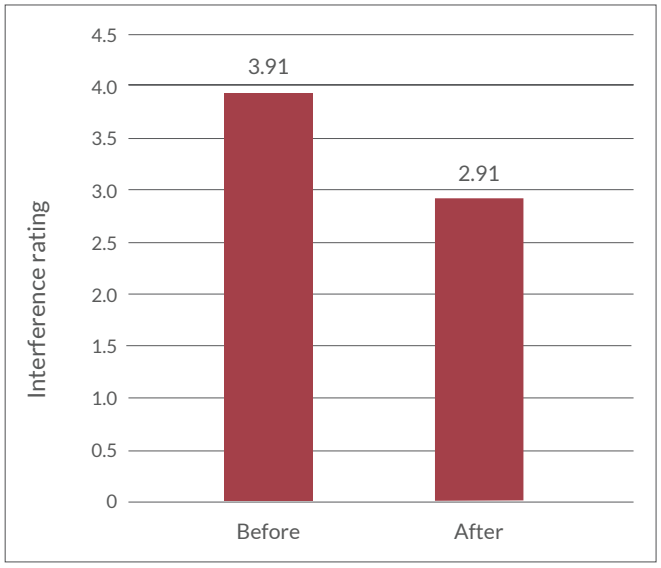


FIGURE 2:

Average rating of interference of sinus symptoms with daily life



DISCUSSION

Our OMT sinusitis protocol has safely demonstrated the subjective improvement of sinus symptoms among the subjects. Our data supports the hypothesis that OMT sinusitis protocol results in improved sinusitis symptoms. All 22 subjects reported improvement in self-reported nasal congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue.

Our OMT sinusitis protocol was developed to affect muscle constraint on venous and lymphatic flow, and to alter somato-visceral reflexes to the sinuses.[12] Muscle activity is a well-recognized mechanism of lymphatic flow. Because lymphatic channels are embedded in the cervical fascia, OMT techniques using soft tissue, muscle energy and myofascial release to the cervical region contribute to increased lymphatic flow to the head.[11] In addition, lymphatic fluid from the head and neck enter the central circulation in the subclavian and internal jugular veins. Treatment of somatic dysfunction in these areas may further improve lymphatic flow.[11] Furthermore, our sinusitis protocol was also developed to address somatic dysfunctions to balance the autonomic nervous systems to ultimately relieve symptoms of sinusitis. Autonomics also play an important role in understanding the pathophysiology of OMT in sinusitis. Sympathetic fibers to the head arise from the upper thoracic segments of the cord (T1–T3). Preganglionic fibers ascend from there and synapse at the superior cervical ganglion located in the upper cervical area. Postganglionic fibers then join the internal carotid plexus, becoming part of the deep petrosal nerve and the nerve of the pterygoid canal. Sympathetic supply to the nose and paranasal sinus passes through the sphenopalatine ganglion in the pterygopalatine fossa. The sympathetic nervous system to the nose produces vasoconstriction and increased nasal airway patency.[11] Therefore, tissue changes in the upper cervical and upper thoracic regions would be expected to accompany sympathetic motor dysfunction of the nose and paranasal sinuses in patients with sinusitis.[11] OMT can be used to impact sympathetic vasomotor tone to the sinus area and ultimately improve the symptoms of sinusitis. Henley-Ivins *et al*. have demonstrated the benefit of OMT balancing autonomics by quantifying the relationship with myofascial release and vagal response of the autonomics.[13] Sphenopalatine ganglion (SPG) acupuncture has also shown to improve nasal ventilation by increasing sympathetic nerve excitability in healthy volunteers.[14] Furthermore, a Chapman point was used to further influence viscero-somatic reflexes to sinuses.

Our study further builds upon Lee-Wong *et al*.'s work on OMT for sinusitis. Lee-Wong *et al*. performed a study of 15 patients with chronic sinusitis in an outpatient allergy clinic that demonstrated sinus pain, headache, sense of smell and fatigue.

Our study further builds upon Lee-Wong *et al*.'s work on OMT for sinusitis. Lee-Wong *et al*. performed a study of 15 patients with chronic sinusitis in an outpatient allergy clinic that demonstrated improvement in symptoms using OMT techniques. The study utilized direct pressure and sinus drainage techniques aimed to relieve sinus pain, pressure and congestion by unblocking nasal passages and improving lymphatic flow.[6] Our study extended

the Lee-Wong *et al*. study by including a larger sample group and designing an OMT sinusitis protocol that may be helpful for physicians treating sinusitis.

The limitations of the study include small sample size and lack of a control group to compare the effectiveness of OMT to the standard of care for sinusitis. The study was also confounded by several factors related to subjects, including varying causes of sinusitis, duration and severity of sinusitis, and previous treatments of sinusitis. Furthermore, the study does not explore the efficacy of each technique used in our OMT sinusitis protocol. Thus, it is difficult to deduce which technique was most beneficial in treatment of sinusitis. Future studies with larger and more diverse subject populations can serve as a better predictor of the effectiveness of OMT in a population.

CONCLUSION

Our study has shown that OMT results in symptomatic improvement of sinusitis by alleviating nasal congestion, postnasal drip, sinus pain, headache, loss of smell and fatigue. Thus, OMT may be recommended as a stand-alone treatment for patients suffering from sinusitis or may be used in conjunction with traditional therapies to maximize treatment benefits and to relieve symptoms of sinusitis in primary care settings. Further studies that replicate these results may support the inclusion of OMT techniques in current standards of care. Additional studies with more subjects and a control or sham group are warranted to assess efficacy of the treatment. Moving forward, we hope to build the stepping-stones of exploring OMT as a mainstay treatment option for sinusitis by assessing and testing its efficacy against a larger population sample size. Through this work, OMT can also be further explored as treatment in other disease processes.

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REFERENCES

1. Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, *et al*. Clinical practice guideline (update): adult sinusitis. *Otolaryngol Head Neck Surg*. 2015; 152(2 Suppl):S1–S39. doi:10.1177/0194599815572097
2. Battisti AS, Modi P, Pangia J. Sinusitis. In: *StatPearls*. StatPearls Publishing; 2021. PMID:29262090
3. Fokkens WJ, Lund VJ, Mullol J, *et al*. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. *Rhinology*. 2012;50(1):1–12. doi:10.4193/Rhino12.000
4. Lintonbon D. A study to investigate the effect of 'frontal lift' osteopathic manipulative technique (OMT) in patients with chronic sinusitis. *Am J Biomed Sci & Res*. 2019;3(2):213–222. doi:10.34297/AJBSR.2019.03.000665
5. Gosepath J, Pogodsky T, Mann WJ. Characteristics of recurrent chronic rhinosinusitis after previous surgical therapy. *Acta Otolaryngol*. 2008;128(7):778–784. doi:10.1080/00016480701724896
6. Lee-Wong M, Karagic M, Doshi A, Gomez S, Resnick D. An osteopathic approach to chronic sinusitis. *J Aller Ther*. 2011;2(2): 1–3. doi:10.4172/2155-6121.1000109
7. Johnson SM, Kurtz ME. Osteopathic manipulative treatment techniques preferred by contemporary osteopathic physicians. *J Am Osteopath Assoc*. 2003;103(5):219–224. PMID:12776762
8. Johnson SM, Kurtz ME. Conditions and diagnoses for which osteopathic primary care physicians and specialists use osteopathic manipulative treatment. *J Am Osteopath Assoc*. 2002;102(10):527–532, 537–540. PMID:12401039
9. Pintal WJ, Kurtz ME. An integrated osteopathic treatment approach in acute otitis media. *J Am Osteopath Assoc*. 1989;89(9):1139–1141. PMID:2793535
10. Sato A, Schmidt RF. The modulation of visceral functions by somatic afferent activity. *Jpn J Physiol*. 1987;37(1):1–17. doi:10.2170/jjphysiol.37.1
11. Wu S, Hostoffer RW, Gibbons K, Shaw HH, Shaw MB. Osteopathic considerations in patients with head, eyes, ears, nose, and throat disorders. In: *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications, and Research*. 4th ed. Wolters Kluwer; 2018: 1404–1411.
12. 12. Shrum KM, Grogg SE, Garton P, Shaw HH, Dyer RR. Sinusitis in children: the importance of diagnosis and treatment. *J Am Osteopath* Assoc. 2001;101(5):S8–S13. PMID:11409262
13. Henley CE, Ivins D, Mills M, Wen FK, Benjamin BA. Osteopathic manipulative treatment and its relationship to autonomic nervous system activity as demonstrated by heart rate variability: a repeated measures study. *Osteopath Med Prim Care*. 2008;2(1):7. doi:10.1186/1750-4732-2-7
14. Wang K, Chen L, Wang Y, Wang C, Zhang L. Sphenopalatine ganglion acupuncture improves nasal ventilation and modulates autonomic nervous activity in healthy volunteers: A randomized controlled study. *Sci Rep*. 2016;6(1):29947. doi:10.1038/srep29947