

Prescribing Herbal Medicines to Complement Osteopathic Manipulative Treatment for Chronic Pain and Dysfunction

David R. Beatty, DO

ORIGINAL CONTRIBUTION

Introduction

Chronic pain is very common in the United States, with over 20% of Americans reporting daily pain of at least 3 months' duration in a 2012 comprehensive survey.¹ Over three-quarters of those with chronic back pain reported trying some form of complementary medicine.² The most frequently used complementary therapies are non-vitamin and non-mineral natural products including plant medicines.³

Musculoskeletal pain is the most common problem treated by osteopathic manipulative treatment (OMT).⁴ Conditions with chronic pain and somatic dysfunction amenable to this treatment include arthralgia and arthritis, primary headaches, lymphedema, menopause, and neuralgia and neuritis. These problems are seldom curable by OMT alone, and many patients use or could benefit from other therapies, affording osteopathic physicians an opportunity to refine or recommend herbal medicines for improved safety and effectiveness of self-care.

Arthralgia/Arthritis

Somatic dysfunction of degenerated joints can be safely and effectively treated with a careful approach using a combination of indirect and modified direct techniques. Osteoarthritic joints can be gently moved into a restrictive barrier using traction to unload the joint before applying an activating force such as isometric muscle contraction, myofascial stretch, or joint articulation. (Figure 1) Such unloaded movements restore motion and reduce joint inflammation by improving circulation via the respiratory-circulatory model.⁵

Turmeric

Herbal treatments for osteoarthritic joints similarly reduce inflammation and improve mobility.^{6(pp419-420)} The most known, used, and studied plant for osteoarthritis relief is turmeric.⁷ Of the 8 studies that met the selection criteria in the most recent systematic review,⁷ 3 reported a mean reduction of -2.04 on the pain visual analogue score compared to placebo. Four additional studies showed a mean decrease of -15.36 on the Western Ontario and McMaster Univer-

From the West Virginia School of Osteopathic Medicine in Lewisburg.

Financial disclosures: None reported.

Correspondence address:

David R. Beatty, DO, C-SPOMM
West Virginia School of Osteopathic Medicine
400 Lee St. N.
Lewisburg, WV 24901
(304) 647-6335

Submitted for publication September 6, 2017; final revision received August 28, 2018; manuscript accepted for publication August 30, 2018.

Treatment demonstration photos originally appeared in *The Pocket Manual of OMT: Osteopathic Manipulative Treatment for Physicians* by David R. Essig-Beatty, To Shan Li, Karen M. Steele, Zachary J. Comeaux, John M. Garlitz, James W. Kribs, William W. Lemley. ©2011, West Virginia School of Osteopathic Medicine. Reprinted with permission.

Plant photos © David R. Beatty.

sities Osteoarthritis Index. Dietary use of this Indian spice can be supplemented by 4 times a day capsules of the dried root for relief of osteoarthritis. (Table 1)

Black cohosh

Better known for reducing menopausal symptoms,⁹ black cohosh root (*Actaea racemosa*) (Figure 2) also has an established history of effectiveness for rheumatological disorders.^{6(p420)} An anti-inflammatory action, due in part to the constituent salicylic acid, is complemented by antispasmodic and nervine relaxant properties to relieve joint pain, improve motion, and reduce swelling for single degenerated joints or systemic osteoarthritis. (Table 2)

(continued on page 21)

Figure 1. Circumduction with traction for the glenohumeral joint can improve motion without worsening pain.



Figure 2. Black cohosh has a flowering stalk referred to as a fairy wand.



Figure 3. Flowers of the weeping willow (*Salix babylonica*).



Table 1. Prescribing turmeric for osteoarthritis.⁸

Indications/dosage	500mg capsules QID (standardized to 95% curcumin)
Interactions	Cinnamon
Adverse effects	Rare abdominal bloating
Warnings/contraindications	Bile duct obstruction, gastric ulcer; discontinue prior to surgery
Pharmacologic mechanisms	Anti-inflammatory, antioxidant, analgesic

Table 2. Prescribing black cohosh for osteoarthritis.¹⁰

Indications/dosage	20-80 mg tablets PO BID (standardized to 1 mg triterpene glycosides/20 mg)
Interactions	Immunosuppressants (reduced effect)
Adverse effects	Rare
Warnings/contraindications	Estrogen-sensitive cancers, pregnancy
Pharmacologic mechanisms	Anti-inflammatory (salicylic acid); serotonin reuptake inhibition

Figure 4. Solomon’s seal in early spring.



Figure 5. Cervical segmental diagnosis and treatment.



Figure 6. Frontal lift.



Figure 7. Feverfew capsules are effective for migraines.



Figure 8. Lavender essential oil helps insomnia.



Figure 9. Thoracic pump.



Figure 10. Upper extremity petrissage.



(continued from page 18)

Additional options

Other herbs useful for degenerative joint disease include cayenne (see Neuralgia), willow bark (Figure 3), and Solomon’s seal (Figure 4).

The anti-inflammatory and analgesic effects of the inner bark of the willow tree (*Salix* species), the original source of acetylsalicylic acid in aspirin, are supported by a systematic review concluding that oral willow bark extract in daily doses of up to 240 mg (60 mg capsules TID or QID) has evidence of effectiveness for low back pain and osteoarthritis.¹¹ In the review, 3 well-designed studies were noted to demonstrate a dose-dependent analgesic effect similar to the nonsteroidal anti-inflammatory rofecoxib in patients with low back pain and osteoarthritis.

Solomon’s seal root (*Polygonatum biflorum*) has not been as well studied or standardized, but history of use as a tincture for joint pain is supported by biochemical analyses revealing steroid saponins.¹²

Chronic Pain

Opium poppy, the prototypical plant medicine for pain, is inappropriate for most cases of chronic pain due to tolerance and dependence. Many other herbs have been tried, but only one has demonstrated efficacy for chronic pain of all causes. The most recent systematic review of marijuana (*Cannabis* species) concluded that there is moderate-quality evidence for effectiveness in both chronic pain and spasticity.¹³ In the 79 studies meeting inclusion criteria, mean reduction in both number of patients with decreased pain (37%) and in pain rating (-0.46) was significantly greater than for those taking a placebo.

While dosing of inhaled or ingested cannabis is variable, a tincture of a high cannabidiol (CBD) variety has advantages of standardized extraction, high analgesic and low psychoactive effects, and fast onset of action if administered sublingually. In states where medical cannabis is still illegal, an oil extract from a high-CBD variety of industrial hemp (*Cannabis sativa* bred for negligible tetrahydrocannabinol) is available in many natural food stores. In states with legalized whole plant cannabis, physician prescription is usually for the maximum monthly amount (120 g Q 30D), with form, dose, and frequency determined by the patient with help from a dispensary agent.

Cannabis should be prescribed with caution for those who operate machinery, take other sedatives, or have a history of substance abuse, mental illness, or seizure disorder.

Headache

Integrating OMT into treatment of primary headaches is supported by systematic reviews of manual therapy.^{14,15,16} Treatment of related cranial, cervical, and thoracic somatic dysfunctions can relieve tension and cervicogenic headaches and prevent migraines.¹⁷ (Figures 5-6)

Plant medicines receiving support from systematic reviews for treatment of primary headaches include feverfew, peppermint, and lavender. Feverfew (*Tanacetum parthenium*) is efficacious for prevention of migraines and with no major safety issues.^{18,19} (Figure 7) (Table 3) In one study cited in these reviews, there was a three-fold increase ($P < .02$) in headache frequency for feverfew users who switched to placebo.²⁰

Simplicity and safety of inhaled essential oils has spurred their recent popularity as headache remedies. Peppermint oil (*Mentha piperita*) applied topically or inhaled can be effective for tension headaches.²² (Figure 8) A significant reduction in headache severity compared to placebo and comparable to acetaminophen was noted in the 2 trials cited in the Kligler and Chaudhary review. Inhaled lavender oil (*Lavandula angustifolia*) has early evidence that it is helpful for insomnia often related to headaches.²³ In the systematic review by Fisser and Pilkington, 5 of the 8 studies meeting the inclusion criteria showed either increased deep sleep or reduced wake frequency compared to controls.

Lymphedema

An osteopathic approach to treatment of lymphedema due to venous insufficiency involves removing structural impediments to drainage, particularly tension at related fascial diaphragms,

(continued on page 22)

Table 3. Prescribing feverfew for migraine.²¹

Indications/dosage	Prophylaxis: 50-100 mg capsules PO QD (standardized to 0.2% parthenolide) Control: 100 mg capsule PO Q 30 minutes
Interactions	Anticoagulants (increased bleeding risk)
Adverse effects	Allergy
Warnings/contraindications	Pregnancy, hypersensitivity
Pharmacologic mechanisms	Arachidonic acid inhibition; platelet inhibition

(continued from page 21)

improving autonomic balance by sympathetic and parasympathetic normalization, and applying a lymphatic pump or soft tissue drainage technique (effleurage or petrissage).²⁴ (Figures 9 and 10) This approach can be complemented by prescription of an herbal lymphatic.

Placing a buckeye in your pocket may not be an effective healing charm, but a medicine made from the seed of the related horse chestnut tree is effective at reducing edema from venous insufficiency. (Figure 11) The most recent peer-reviewed systematic review concluded that horse chestnut seed extract improves the pain and swelling of chronic venous insufficiency with only rare and mild side effects.²⁵ In the 6 controlled studies cited by Pittler and Ernst, there was a significant reduction in leg pain compared to placebo. The most active component is believed to be the saponin escin, a potent vasoconstrictor, but the extract also contains esculin, another saponin with antithrombin activity.²⁶ (Table 4)

Figure 11. Horse chestnut tree with seed-containing fruit.



Figure 13. Venous sinus drainage of metopic suture to improve drainage from head and face



Menopausal Vasomotor Instability

OMT has been successfully applied for autonomic dysfunction (hot flashes, night sweats) related to vasomotor instability associated with menopause. Treating fascial diaphragm restrictions related to respiration and cranial fluctuation, thoracolumbar dysfunctions related to sympathetic imbalance, and upper cervical and sacral dysfunctions related to parasympathetic imbalance is recommended for women experiencing hot flashes, insomnia, myalgias, or arthralgias related to menopause.²⁷ (Figures 12-13)

Whether 3-leaved or 4, red clover has a longstanding use for relieving menopausal symptoms that is supported by a systematic review of efficacy.²⁸ (Figure 14) In this meta-analysis of 17 studies, vaginal dryness and atrophy were both significantly improved with red clover compared to control groups. This effectiveness is due at least in part to isoflavones that act as phytoestrogens. This raises a potential contraindication for women at risk for estrogen-sensitive breast cancers, though this risk has evidence of being less for red clover

(continued on page 23)

Figure 12. Thoracic inlet myofascial release to improve respiration and circulation

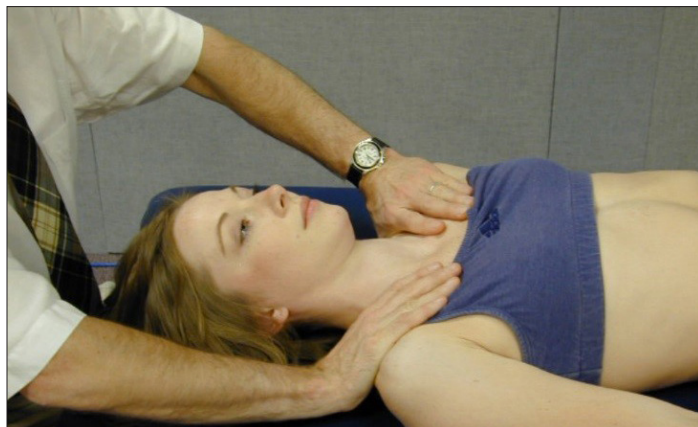


Figure 14. Red clover flower and leaf



(continued from page 22)

than for other estrogens.²⁹ (Table 5) Red clover flowers also contain coumarins and salicylates that promote circulation, resulting in its classification as a lymphatic and additional uses for pharyngitis and chronic skin conditions.

Neuralgia/Neuritis

Osteopathic diagnosis and treatment of sciatic neuritis primarily seeks to identify and modify biomechanical causes of nerve compression such as piriformis syndrome and degenerative joint or disc disease.³¹ When nerve, joint, or disc inflammation is present, indirect techniques such as counterstrain and myofascial release can restore

motion without triggering neuropathic pain.³² (Figure 15)

Herbs useful in the treatment of sciatic and other neuritides include nerve relaxants and tonics, antispasmodics, and anti-inflammatories. St. John’s wort, although recently known for antidepressant effects,³³ has each of these actions and enjoys a long-standing history of clinical effectiveness for sciatic neuritis.^{6(p371)} (Figure 16) It also has many drug interactions as a cytochrome P3A4 inducer, and can cause photodermatitis or psychosis in some individuals. (Table 6)

Infantile colic can be due to a compressive neuralgia causing pain and nursing

(continued on page 24)

Figure 15. Counterstrain treatment of a piriformis tender point can relieve sciatic neuritis.



Table 4. Prescribing horse chestnut for chronic venous insufficiency.²⁶

Indications/dosage	300 mg capsules PO BID (standardized to 50 mg escin)
Interactions	Increased effect of anticoagulants
Adverse effects	Rare gastrointestinal complaints, dizziness, headache, pruritus
Warnings/contraindications	Bleeding disorders, hepatic or renal impairment, pregnancy
Pharmacologic mechanisms	Venoconstriction, decreased venous permeability

Figure 16. St. John’s wort flowers and leaves have nerve, anti-inflammatory, and antispasmodic properties.



Table 5. Prescribing red clover for menopause.³⁰

Indications/dosage	Menopausal symptoms: 40-80 mg capsules PO BID Other: Infusion 8 oz TID; tincture (1:10 in 45% alcohol) 1-2 ml TID
Interactions	Synergy – estrogens, anticoagulants
Adverse effects	Estrogen-like effects, rash
Warnings/contraindications	Estrogen-sensitive cancers, endometriosis, fibroids, coagulation disorders, pregnancy
Pharmacologic mechanisms	Phytoestrogen, lymphatic, antispasmodic, expectorant

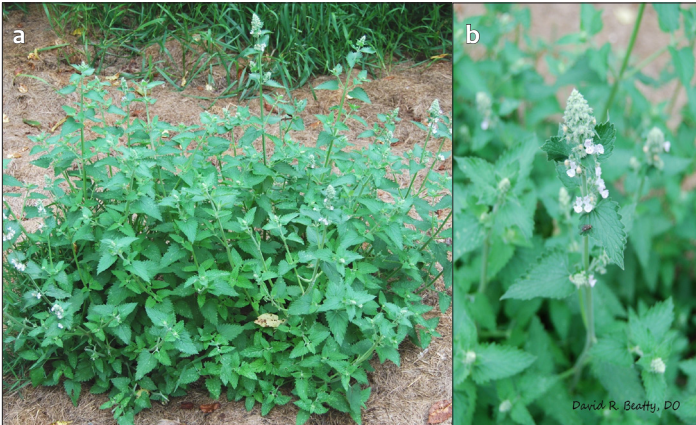
Table 6. Prescribing St. John’s wort for sciatic neuritis.³⁴

Dosage	300 mg capsules PO TID (standardized to 0.3% hypericin)
Interactions	Tyramine foods, oral contraceptives, antidepressants, CYP3A4 inducer
Adverse effects	Photosensitivity, psychosis
Warnings/contraindications	Alzheimer disease, bipolar disorder, psychosis, schizophrenia
Pharmacologic mechanisms	Dopaminergic and SSRI effects

Figure 17. Finger placement and direction of force for occipital decompression.



Figures 18a and 18b. Catnip grows in clumps (a) of opposing bluish-green leaves with erect stems topped by clusters of tiny white two-lipped flowers (b).



(continued from page 23)

or digestive difficulties. An osteopathic approach to colic involves diagnosis and treatment of cranial and upper cervical somatic dysfunctions that can irritate vagus, trigeminal, or hypoglossal nerves.³⁵ Prolonged or traumatic childbirth can contribute to non-physiological dysfunction at these areas. Skilled treatment of atlanto-axial or occipitoatlantal dysfunction or a sphenobasilar strain can relieve the gastro-intestinal distress or head pain related to persistent crying. Decompression of a jammed occipital condyle can open the hypoglossal canal, relieving nursing or swallowing difficulties. (Figure 17)

Most people are familiar with catnip (*Nepeta cataria*) as, well, a nip for their cats. (Figure 18) Nepetalactone is the essential oil believed to stimulate olfactory sensory neurons to the amygdala and hypothalamus, triggering the feline pleasure response.³⁶ Humans usually don't respond with such overt sensuality, but longstanding use has established catnip and other aromatic mints as effective for infantile colic.^{6(p476)} This empirical effectiveness is supported by a systematic review that identified herbal teas as having evidence of efficacy for relieving the symptoms of colic.³⁷ In one of the studies cited by Weizman et al, 57% of infants being given herbal tea no longer met the criteria for colic after seven days, compared to 26% receiving placebo.³⁸ Like most aromatic mints, an infusion of catnip warms the stomach and cools the mind with mild antispasmodic and sedative actions resulting from volatile oils, sterols, acids, and tannins. These effects are more pronounced in colicky babies who respond to a small bottle of cooled catnip tea with reduced crying, improved sleep, and less bloating. Alternatively, a few drops of catnip tincture diluted in a tablespoon of olive oil can be gently rubbed on the baby's abdomen. (Table 7)

Table 7. Prescribing catnip for infantile colic.³⁹

Indications/dosage	Infusion 1 oz TID in bottle Tincture 1-3 drops in 1 tbsp olive oil applied topically to abdomen
Interactions	Increased effect – lithium, sedatives
Adverse effects	None known
Warnings/contraindications	Pregnancy
Pharmacologic mechanisms	Diaphoretic, antispasmodic, sedative

Herbal Formulas for Chronic Problems

OMT often proves helpful for reducing pain and improving function in chronic conditions like arthralgia/arthritis, chronic pain, headache, lymphedema, menopausal symptoms, and neuralgia/neuritis. Complementing manual therapy with efficacious herbal prescriptions should improve patient function more than either treatment alone because of differing and non-competitive mechanisms of action, although this proposed additivity hasn't been studied. While botanical prescribing can be more comprehensive with multi-herb formulas, the single herb recommendations summarized in Table 8 have the advantages of established effectiveness, relative safety, known drug interactions, and standardized dosing for electronic prescribing.

References

1. Nahin RL. Estimates of pain prevalence and severity in adults: United States, 2012. *J Pain*. 2015;16(8):769-780.
2. Dubois J, Scala E, Faouzi M, et al. Chronic low back pain patients' use of, level of knowledge of and perceived benefits of complementary medicine: a cross-sectional study at an academic pain center. *BMC Complement Altern Med*. 2017;17(1):193.

(continued on page 25)

Table 8. Herbal prescriptions for selected problems.

CONCERN	HERB	DOSING	CONTRAINDICATIONS
Arthralgia/arthritis	Turmeric (<i>Curcuma longa</i>)	500 mg capsules QID	Bile duct obstruction, gastric ulcer
	Black cohosh (<i>Actaea racemosa</i>)	20-80 mg tablets PO BID	Estrogen sensitivity, pregnancy
Chronic pain	Cannabis (<i>Cannabis</i> species)	Tincture: 5-15 drops SL BID-QID Hemp oil: 5-15 drops PO BID-QID Dried plant: 120 g q 30d	Mental illness, sedative use, seizure disorder, machinery operation
Headache, migraine	Feverfew (<i>Tanacetum parthenium</i>)	Prophylaxis: 50-100 mg capsules PO QD Control: 100 mg capsule PO q 30 minutes	Pregnancy
Headache, tension	Peppermint (<i>Mentha piperita</i>)	Essential oil (10%) 2 drops applied to forehead and temples at onset	
	Lavender (<i>Lavandula angustifolia</i>)	Essential oil 2-4 drops in diffuser at bedtime	
Infantile colic	Catnip (<i>Nepeta cataria</i>)	Infusion 1 oz TID in bottle	None known
Lymphedema – venous insufficiency	Horse chestnut (<i>Aesculus hippocastanum</i>)	300 mg capsules PO BID	Bleeding disorders, hepatic or renal impairment, pregnancy
Menopausal vasomotor instability	Red clover (<i>Trifolium pratense</i>)	40-80 mg capsules PO BID	Estrogen sensitivity, bleeding disorders, pregnancy
Neuralgia/neuritis	St. John's wort (<i>Hypericum perforatum</i>)	300 mg capsules PO TID	Alzheimer disease, bipolar, psychosis, schizophrenia

(continued from page 25)

- Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Reports*. 2008;12. <https://www.cdc.gov/nchs/data/nhsr/nhsr012.pdf>. Accessed August 28, 2018.
- Johnson S, Kurtz M. Conditions and diagnoses for which osteopathic primary care physicians and specialists use osteopathic manipulative treatment. *J Amer Osteopath Assoc*. 2002;102(10):527-540.
- Heinking K, Lipton J, Valashinas B. Multiple small joint diseases in an elderly patient. In: Chila AG, ed. *Foundations of Osteopathic Medicine*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2011: 956-957.
- Hoffman D. *Medical Herbalism: The Science and Practice of Herbal Medicine*. Rochester, VT: Healing Arts Press; 2003.
- Daily JW, Yang M, Park S. Efficacy of turmeric extracts and curcumin for alleviating the symptoms of joint arthritis: a systematic review and meta-analysis of randomized clinical trials. *J Med Food*. 2016;19(8):717-729.
- Turmeric. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
- Beer AM, Osmer R, Schnitker J, Bai W, Mueck AO, Meden H. Efficacy of black cohosh (*Cimicifuga racemosa*) medicines for treatment of menopausal symptoms – comments on major statements of the Cochrane Collaboration report 2012 “black cohosh (*Cimicifuga* spp.) for menopausal symptoms (review)”. *Gynecol Endocrinol*. 2013;29(12):1022-1025.
- Black cohosh. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
- Vlachojannis JE, Cameron M, Chrubasik S. A systematic review on the effectiveness of willow bark for musculoskeletal pain. *Phytother Research*. 2009;23(7):897-900.
- Singh SK, Singh S, Verma SK, Jain P, Dixit V, Solanki S. A review on plants of the genus *Polygonatum*. *Int J Res Dev Pharm Life Sci*. 2013;2(3):387-397.
- Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: A systematic review and meta-analysis. *JAMA*. 2015;313(24):2456-73.
- Posadzki P, Ernst E. Spinal manipulations for tension-type headaches: a systematic review of randomized controlled trials. *Complement Ther Med*. 2012;20(4):232-239.
- Chaibi A, Tuchin PJ, Russell MB. Manual therapies for migraine: a systematic review. *J Headache Pain*. 2011;12(2):127-133.
- Miller J, Gross A, D'Sylva J, et al. Manual therapy and exercise for neck pain: a systematic review. *Man Ther*. 2010;15(4):334-354.
- Heinking KP, Kappler RE, Ramey KA. Head and suboccipital region. In: Chila AG, ed. *Foundations of Osteopathic Medicine*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2011:507-510.
- Ernst E, Pittler MH. The efficacy and safety of feverfew (*Tanacetum parthenium* L.): an update of a systematic review. *Public Health Nutr*. 2000;3(4A):509-514.
- Pareek A, Suthar M, Rathore GS, Bansal V. Feverfew (*Tanacetum parthenium* L.): a systematic review. *Pharmacognosy Rev*. 2011;5(9):103-110.

(continued on page 26)

(continued from page 25)

20. Johnson ES, Kadam NP, Hylands DM, Hylands PJ. Efficacy of feverfew as prophylactic treatment of migraine. *Br Med J (Clin Res Ed)*. 1998;291(6495):569-573.
21. Feverfew. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
22. Kligler B, Chaudhary S. Peppermint oil. *Am Fam Physician*. 2007;75(7):1027-1030.
23. Fisman KL, Pilkington K. Lavender and sleep: a systematic review of the evidence. *Eur J Integrative Med*. 2012;4(4): e436–e447. https://www.researchgate.net/publication/244993841_Lavender_and_sleep_A_systematic_review_of_the_evidence. Accessed August 27, 2018.
24. Tettambel M. Lower extremity swelling in pregnancy. In: Chila AG, ed. *Foundations of Osteopathic Medicine*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2011:963-964.
25. Pittler MH, Ernst E. Horse chestnut seed extract for chronic venous insufficiency. *Cochrane Database Syst Rev*. 2012. doi:10.1002/14651858.CD003230.pub4
26. Horse chestnut. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
27. Sergueef N, Nelson K. *Osteopathy for the Over 50s*. Edinburgh, Scotland: Handspring Publishing; 2014:365-368.
28. Ghazanfarpour M, Sadeghi R, Roudsari RL, Khorsand I, Khadivzadeh T, Buoio B. Red clover for treatment of hot flashes and menopausal symptoms: a systematic review and meta-analysis. *J Obstet Gynaecol*. 2016;36(3):301-311.
29. Fritz H, Seely D, Flower G, et al. Soy, red clover, and isoflavones and breast cancer: a systematic review. *PLoS One*. 2013;8(11):e81968. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081968> on 08/28/18 <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081968>. Accessed August 28, 2018.
30. Red clover. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
31. Fraix MP, Seffinger MA. Acute low back pain. In: Chila AG, ed. *Foundations of Osteopathic Medicine*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2011:1010-1014.
32. Sergueef N, Nelson K. *Osteopathy for the Over 50s*. Edinburgh, Scotland: Handspring Publishing; 2014:191-192.
33. Linde K, Berner MM, Kriston L. St John's wort for major depression. *Cochrane Database Syst Rev*. 2008. doi:10.1002/14651858.CD000448.pub3
34. St. John's wort. Medscape [mobile app for iPhone]. Version 5.11.8. WebMD LLC; 2018.
35. Carriero JE. *An Osteopathic Approach to Children*. 2nd ed. London: Churchill Livingstone Elsevier; 2009:233-235.
36. Turner R. How does catnip work its magic on cats? *Scientific American*, May 29, 2007. <https://www.scientificamerican.com/article/experts-how-does-catnip-work-on-cats/>. Accessed August 28, 2018.
37. Garrison MM, Christakis DA. A systematic review of treatments for infant colic. *Pediatrics*. 2000;106(supplement 1):184-190.
38. Weizman Z, Alkrinawi S, Goldfarb D, Bitran C. Efficacy of herbal tea preparation in infantile colic. *J Pediatr*. 1993;122(4):650-652.
39. Catnip (*Nepeta cataria*). *PDR For Herbal Medicines*. 4th ed. Montvale, NJ: Thomson Healthcare Inc.; 2007:172-173. ■