

Osteopathy and Nutritional Supplements

Thesis submission for BSc

By Raybe Lee

January 14, 2015

Introduction

Osteopathy belongs to complementary and alternative medicine. Many see it as a therapy focusing on the physical manipulation of the musculoskeletal system. In truth, the concept of osteopathy was more comprehensive than what meets the eyes. Osteopathy was founded by Andrew Taylor Still who believed in creating a therapeutics system that focuses on the natural forces in healing rather than uses chemical agents (Still 1902). It has its core in respecting the holistic nature of the whole body. Later on, Leo Page suggested that the practice of osteopathy uses various measures to maintain and restore structural integrity and ensure physiological function (Parsons and Marcer 2006). In modern day osteopathy, recent definitions of osteopathy have all emphasize the relationship between body structure and function, their integrity and ability to heal itself.

From the angle of nutrition, a balanced diet providing sufficient nutritional need for the body is essential to maintain optimal health and body functioning. Nutritional support in the form of supplementation has gain popularity in complementing the inadequacy of the modern diet. People with digestion problems due to bowel disorders such as celiac disease may have their ability to absorb nutrients impaired. Different developmental stage and pregnancy can also change the nutritional need of the body.

In the angle of holistic nutrition, more evidence has suggested the value of nutritional support in the alleviation of vitamin and mineral deficiency related diseases (Balch 2010). The increased appreciation of plant based nutrients including phytonutrients and flavanoids has also lead to suggestion of the potential beneficial effect of these natural molecules in inducing healing and maintaining body wellbeing. It is important to note that the use of supplementation at appropriate dosage is needed to avoid toxicity due to overdose. The recommended daily allowance (RDA) and recommended daily intake (RDI) dosage listed in this thesis are based on guidelines suggested by the Food and Nutrition Board of the National Research Council (Murray 1996). One should remember that supplementations are to be used as support, rather than as replacement for a balanced diet.

For the various structures that are related to the practice of osteopathy, the musculoskeletal system is particularly relevant. Proper nutritional support for the musculoskeletal system would support better body structure and functioning, which would align with the goal of osteopathic therapy. In this thesis, we will introduce the topics of how nutritional supplements can be complementary to the health of various musculoskeletal components including bones, cartilages, joints and ligaments. In addition, we will conclude this thesis by examining the topic of how nutritional supplements can be complementary to the practice of osteopathy.

Nutritional Supplements for Bone Health:

Calcium is an important mineral for bone formation and strength (Reader's_Digest 2008). In addition, it is needed for both muscle contraction and nerve signalling. Low calcium intake is associated with loss of bone mass and density (Nieves et al. 2008). Calcium deficiency in children is linked with rickets and bone deformities (Kruse 1995). The recommended daily allowance (RDA) for calcium is at a minimum of 1000 mg daily for adults (Murray 1996). Children and preadolescents would have a higher demand for calcium of 1200 mg per day. Breastfeeding women and the elderly have higher need for calcium and may benefit from calcium supplementation, particularly with their susceptibility to osteoporosis (Reader's_Digest 2008). Other than dairy products, green leafy vegetable such as kale is an even richer source of absorbable calcium (Heaney and Weaver 1990). In terms of supplementation, to avoid potential lead contamination in calcium supplement preparation, young children should use refined calcium carbonate or chelated calcium products for supplementation (Murray 1996). Calcium bond to citrate, gluconate, or other organic molecules are all good supplementation choices. Calcium carbonate may not be absorbed as effectively due to its need to be solubilised and ionized by stomach acid. Natural oyster shell calcium and related products may not be preferable due to potential lead contamination. Supplementation dosages should be based on RDA value. There is the suggestion that women should supplement with 500-700 mg of calcium citrate twice per day without exceeding a total of 1,000-1,200 mg from all sources (Weil 2013). For men, supplementation of calcium should be done with caution, as high amounts of calcium intake is linked to prostate cancer risk (Weil 2013).

Vitamin D is a mineral that aids in calcium absorption, and its deficiency has been associated with rickets in children and osteomalacia in adults (Murray 1996). Recently, Vitamin D has also been shown to have other beneficial health effect such as prevention of cancer (Holick 2008). Vitamin D can be generated from our own body by exposure to sunlight. Cod liver oil, cold-water fish such as salmon, butter and egg yolks are all good sources of vitamin D (Murray 1996). In terms of vegetables, the best sources are dark green leafy ones (Murray 1996). Supplementation would be useful for people with limited sun exposure, or those at risk of osteoporosis such as the elderly. Although the RDA is 200 to 400 I.U. daily, higher supplementation dosages have been recommended for vitamin D related health benefits. Both men and women are recommended to supplement with 2,000 I.U. of vitamin D per day (Weil 2013).

Magnesium has also been suggested to affect calcium levels in the body. Similar to Calcium, it is also essential in our body for maintaining muscle and nerve health. The RDA for magnesium is 350 mg per day for adult male and 280 mg per day for adult female (Murray 1996). The elderly has an increased need for magnesium. Due to our modern diet being rich in processed food, many people do not have the RDA level of magnesium intake. Deficiency in magnesium can lead to musculoskeletal problems such as nerve problems, muscle contractions and cramps. Magnesium deficiency has also been suggested as a potential factor in the development of fibromyalgia (Murray 1996). Magnesium deficiency has also been linked with osteoporosis (Rude et al. 1999; Stendig-Lindberg et al. 2004). It is important to note that excessive calcium intake can lead to poor magnesium levels in the body. On the other hand, magnesium can help regulate proper calcium metabolism. Tofu, legumes, seeds, nuts, whole grains and green leafy vegetables are all good sources of dietary magnesium sources (Murray 1996). Magnesium citrate is one of the good forms of oral magnesium supplement (Bohmer et al. 1990; Lindberg et al. 1990). Supplementation of magnesium of 6 mg per 2.2 pounds body weight has been recommended for general people, while twice of this amount could be used for people with magnesium deficiency related diseases (Murray 1996).

Vitamin K₁ has been shown to aid bone formation. It is important in converting the bone protein osteocalcin, a major noncollagen protein in the bones, from its inactive form to its active form by binding to calcium (Suttie 1992). Osteoporosis related bone fracture appears to be linked with low blood levels of vitamin K₁ (Bitensky et al. 1988). RDA for vitamin K₁ is between 60 to 65 µg for females and 70 to 80 µg for males in adults (Murray 1996). No RDI has been recommended. However, for people with digestion problems, supplementation of vitamin K₁ may be beneficial (Reader's_Digest 2008). Green leafy vegetables are a very good source of vitamin K₁. Supplementation with a 150 to 500 µg dosage of vitamin K₁ is acceptable (Murray 1996).

Nutritional Supplements for Cartilage, Ligament and Joint Health:

Glucosamine is a molecule that our body made with function of stimulating the making of key structural components of cartilage (Murray 1996). There may be potential beneficial effect of glucosamine supplementation to osteoarthritis (Tat et al. 2007). Glucosamine is not readily available from food and supplements of glucosamine are usually derived from exoskeleton of crustaceans such as shrimp, lobsters and crabs (Murray 1996). Glucosamine sulfate is the preferred form for intake. The recommended intake dosage for glucosamine sulfate is 500 mg three times per day (Murray 1996).

Chondroitin sulfate is another important molecule involved in cartilage formation (Balch 2010). Chondroitin sulfate has been suggested to maintain the health of joint cartilage by attracting water to the joints while preventing joint cartilage premature degeneration (Balch 2010). It

appears to be effective in alleviating knee joint pain and osteoarthritis of the knee. For a person of weight between 120 and 200 pounds, intake of 1,200 mg of chondroitin daily is recommended (Weil 2013).

S-Adenosylmethionine (S-AMe) is found to be a naturally occurring molecule that delivers sulfur to cartilage in the joints (Weil 2013). Intake of S-AMe as supplements can be beneficial to joint and connective tissue disorders, helping arthritis and fibromyalgia (Balch 2010). Although further evidence is needed to prove the function of S-AMe in osteoarthritis (Rutjes et al. 2009), it nevertheless appears to be helpful in reducing joint pain and improving joint function (Soeken et al. 2002). S-AMe supplementation is not recommended for children under the age of twelve. For adults, S-AMe supplementation dosage has been recommended as 400 mg twice per day for two weeks, before decreasing to 200 mg twice per day afterwards (Weil 2013).

Methylsulfonylmethane (MSM) is a naturally occurring sulfur compound (Balch 2010). It may have beneficial properties for joint and bone conditions such as osteoarthritis, although further evidence is needed to prove its efficacy (Kim et al. 2006). Due to its containing sulfur that is needed for the formation of connective tissue, MSM is believed to aid the recovery of torn ligaments when used as supplement (Livestrong.com 2014).

Omega-3 supplementation can help with reduction of inflammation in the body and in joints (Reader's_Digest 2008). Fish oil and flaxseed oil are both good food sources of omega-3 (Balch 2010). Supplementation of omega-3 is particularly helpful for patients suffering from rheumatoid arthritis or osteoarthritis (Murray 1996). Although no RDI was suggested, with a typical dose for supplementation as 2000 mg three times per day is recommended (Reader's_Digest 2008). As omega-3 can affect blood clotting, people that are taking blood-thinning drugs should seek consultations from medical professionals before usage of this supplement.

Vitamin D can also be helpful for joint support. Joint pain has been reported in cases of vitamin D deficiency (Gloth and Tobin 1995).

Nutritional Supplements for the Practice of Osteopathy:

Last but not least, we will examine how nutritional supplements in general can be complementary to the practice of osteopathy.

As mentioned previously, osteopathy is a type of complementary and alternative medicine that has a focus in restoring the balance and health of the body by correcting somatic dysfunctions particularly through the physical manipulation of the musculoskeletal system. With the focus of this thesis on osteopathic practice that is non-invasive manual therapy based, it proposed that nutritional supplements can be of complementary benefits.

In the scope of osteopathy, manual manipulation can provide immediate to long term relief to musculoskeletal disorders. Correction of somatic dysfunction at different layers of the musculoskeletal systems, from bones and joints, to muscles and tendons, to fascia, to cartilage and other connective tissue, many postural, structural and physiological imbalance can be corrected. However, among these dysfunctions, many were originated from lifestyle problems including dietary and nutritional inadequacy.

Common musculoskeletal issues that a manual osteopath face could potentially be improved in parallel by proper nutritional supplementation for the patient. Osteoporosis can be improved by proper calcium supplementation. Symptoms of osteoarthritis could be alleviated, and cartilage health could be by antioxidant and glucosamine supplementations. Many inflammatory type of somatic dysfunction, including tendonitis, and local inflammation, could potentially be alleviated by antioxidant supplementations.

In view of the above, nutritional supplementation is definitely an important complementary practice to aid the effectiveness of manual osteopathy in improving patients' physical conditions. More attention is needed for further evaluation of its efficacy as a supportive modality for manual osteopathic practice.

References:

- Balch PA (2010) Prescription for nutritional healing. New York: Avery
- Bitensky L, Hart JP, Catterall A, Hodges SJ, Pilkington MJ, Chayen J (1988) Circulating vitamin K levels in patients with fractures. *J Bone Joint Surg Br* 70:663-664
- Bohmer T, Roseth A, Holm H, Weberg-Teigen S, Wahl L (1990) Bioavailability of oral magnesium supplementation in female students evaluated from elimination of magnesium in 24-hour urine. *Magnes Trace Elem* 9:272-278
- Gloth FM, 3rd, Tobin JD (1995) Vitamin D deficiency in older people. *J Am Geriatr Soc* 43:822-828
- Heaney RP, Weaver CM (1990) Calcium absorption from kale. *Am J Clin Nutr* 51:656-657
- Holick MF (2008) Vitamin D and sunlight: strategies for cancer prevention and other health benefits. *Clin J Am Soc Nephrol* 3:1548-1554
- Kim LS, Axelrod LJ, Howard P, Buratovich N, Waters RF (2006) Efficacy of methylsulfonylmethane (MSM) in osteoarthritis pain of the knee: a pilot clinical trial. *Osteoarthritis Cartilage* 14:286-294
- Kruse K (1995) Pathophysiology of calcium metabolism in children with vitamin D-deficiency rickets. *J Pediatr* 126:736-741
- Lindberg JS, Zobitz MM, Poindexter JR, Pak CY (1990) Magnesium bioavailability from magnesium citrate and magnesium oxide. *J Am Coll Nutr* 9:48-55
- Livestrong.com (2014) The best supplements for a torn ligament. <http://www.livestrong.com/article/288400-the-best-supplements-for-a-torn-ligament/>
- Murray MT (1996) Encyclopedia of nutritional supplements. New York: Three Rivers Press
- Nieves JW, Barrett-Connor E, Siris ES, Zion M, Barlas S, Chen YT (2008) Calcium and vitamin D intake influence bone mass, but not short-term fracture risk, in Caucasian postmenopausal women from the National Osteoporosis Risk Assessment (NORA) study. *Osteoporos Int* 19:673-679
- Parsons J, Marcer N (2006) Osteopathy: models for diagnosis, treatment and practice. London: Elsevier
- Reader's_Digest (2008) Healthy bones, muscles & joints. Montreal: The Reader's Digest Association
- Rude RK, Kirchen ME, Gruber HE, Meyer MH, Luck JS, Crawford DL (1999) Magnesium deficiency-induced osteoporosis in the rat: uncoupling of bone formation and bone resorption. *Magnes Res* 12:257-267
- Rutjes AW, Nuesch E, Reichenbach S, Juni P (2009) S-Adenosylmethionine for osteoarthritis of the knee or hip. *Cochrane Database Syst Rev*:CD007321
- Soeken KL, Lee WL, Bausell RB, Agelli M, Berman BM (2002) Safety and efficacy of S-adenosylmethionine (SAMe) for osteoarthritis. *J Fam Pract* 51:425-430

- Stendig-Lindberg G, Koeller W, Bauer A, Rob PM (2004) Prolonged magnesium deficiency causes osteoporosis in the rat. *J Am Coll Nutr* 23:704S-711S
- Still AT (1902) *The philosophy and mechanical principles of osteopathy*. Kansas City: Hudson-Kimberly
- Suttie JW (1992) Vitamin K and human nutrition. *J Am Diet Assoc* 92:585-590
- Tat SK, Pelletier JP, Verges J, Lajeunesse D, Montell E, Fahmi H, Lavigne M, Martel-Pelletier J (2007) Chondroitin and glucosamine sulfate in combination decrease the pro-resorptive properties of human osteoarthritis subchondral bone osteoblasts: a basic science study. *Arthritis Res Ther* 9:R117
- Weil A (2013) Supplements for bones and joints.
<http://www.drweil.com/drw/u/ART02862/supplements-for-bone-and-joint-health.html>