THE ROLE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN THERAPY OF MULTIPLE SCLEROSIS

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SUMMARY – The National Center for Complementary and Alternative Medicine defines complementary and alternative medicine as a group of diverse medical and health care systems, practices and products that are not generally considered part of conventional medicine. Multiple sclerosis (MS) is a chronic disabling disease of the central nervous system that affects people during early adulthood. In spite of many approved medications, the treatment options in MS are limited. Many people with MS explore complementary and alternative medicine (CAM) treatments to help control their MS and treat their symptoms. Surveys suggest that up to 70% of people with MS have tried one or more CAM treatment for their MS. People with MS using CAM generally report deriving some benefit from therapies. The CAM therapies most frequently used include diet, omega-3 fatty acids and antioxidants. The therapies with highest potential among CAM therapies that warrant further investigation are low-fat diet, omega-3 fatty acids, lipoic acid, and vitamin D supplementation as potential anti-inflammatory and neuroprotective agents in both relapsing and progressive forms of MS. There are very limited researches evaluating the safety and efficacy of CAM in MS. However, in recent years, the USA National Institutes of Health and the National Multiple Sclerosis Society have been actively supporting the researches in this very important area.

Key words: *Antioxidants; Complementary therapies; Dietary supplements; Fatty acids, essential; Diet, fat restricted; Multiple sclerosis – therapy*

Introduction

The USA National Center for Complementary and Alternative Medicine (NCCAM) defines complementary and alternative medicine as a group of different medical and health care systems, practices and products that are not generally considered part of conventional medicine. This is a large group of therapeutic and diagnostic disciplines that exist outside conventional health care institutions[1]. The boundaries between complementary and alternative medicine (CAM) and conventional medicine (Western or allopathic medicine) are not always sharp or fixed, and specific CAM practices may become widely accepted[2]. The term 'complementary medicine' refers to therapeutic disciplines that are used together with conventional medicine, such as using acupuncture in addition to usual care for helping in the treatment of different pain syndromes. The other part of the term CAM is 'alternative medicine', which refers to the use of CAM in place of conventional medicine[1].

Multiple sclerosis (MS) is a chronic disabling disease of the central nervous system (CNS). Most patients initially have a form of MS referred to as relapsing-remitting MS (RRMS). This type of MS is characterized by periods of clinical stability that are interrupted by relapses or attacks of MS during

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which patients experience clinical worsening. Patients may or may not have complete recovery from these relapses. Approximately 50% of patients with RRMS eventually enter a phase of the illness referred to as secondary progressive MS (SPMS), in which there is progressive worsening of their disease. Patients with SPMS often cease to have clinical relapses of MS. Approximately 10%-15% of people with MS have primary progressive MS (PPMS), in which there is progressive worsening of the neurologic symptoms from the onset of disease. Multiple sclerosis pathogenesis is believed to involve an autoimmune response within the CNS, resulting in multifocal demyelination with varying axonal injury. Treatments for MS are divided into two large categories: those that are intended to control the disease process (human recombinant interferon (IFN)-β, glatiramer acetate, natalizumab and mitoxantrone) and those that help manage the symptoms, which most often include fatigue, depression, cognitive impairment, spasticity, pain and imbalance that can have a significant negative impact on the patient's quality of life; hence, treatment targeting these is critical. Because of the desire to use holistic health care, patient empowerment, improving general health, and relief from physical and psychological symptoms, the majority of MS patients (up to 70%) use CAM as an adjunct to conventional therapies rather than as an alternative to conventional MS therapies, and perceive both conventional and CAM therapies as being beneficial. However, there is always the danger of using some expensive CAM therapies that have no clear benefit or that may even potentially have some toxic effects[3].

Classification of Complementary and Alternative Medicine

NCCAM has developed one of the most widely used classification systems of CAM into five major groups. Although these categories are not formally defined, they are useful for discussing CAM practices[4].

1. Whole medical systems, which are complete systems of theory and practice that have evolved over time in different cultures and apart from conventional Medicine; examples include Traditional Chinese medicine, Naturopathy, Homeopathy and Ayurveda.
2. Mind-body medicine is focused on the interconnection between the mind, body, and spirit. It works under the premise that the mind can affect "bodily functions and symptoms"; examples include meditation, yoga, acupuncture, deep-breathing exercises, guided imagery, hypnotherapy, progressive relaxation, qi gong and tai chi.
3. Biology-based practices use substances found in nature such as herbs, foods, vitamins, and other natural substances. Many are sold over-the-counter as dietary supplements. CAM 'natural products' include probiotics.
4. Manipulative and body-based practices feature manipulation or movement of body parts, such as is done in chiropractic and osteopathic manipulation.
5. Energy medicine is a domain that deals with putative and verifiable energy fields:
   - Biofield therapies are intended to influence energy fields that, it is purported, surround and penetrate the body. No empirical evidence has been found to support the existence of the putative energy fields on which these therapies are predicated.
   - Bioelectromagnetic-based therapies use verifiable electromagnetic fields, such as pulsed fields, alternating current, or direct-current fields in an unconventional manner[1,5]

Acupuncture, Chinese Herbal Medicine, and Traditional Chinese Medicine

Acupuncture is one component of the ancient multimodal therapeutic approach known as Traditional Chinese Medicine (TCM). Other TCM components include herbs, nutrition, exercise, tai chi, stress reduction, and massage[5]. Studies of TCM are surprisingly limited. Clinical trials of acupuncture for treating symptoms in patients with MS are too limited to provide definitive information[6]. In other conditions, acupuncture appears to alleviate pain as well as nausea and vomiting. No rigorous studies of Chinese herbal medicine in MS are available[7]. When performed by a well-trained practitioner, acupuncture is generally well tolerated. In contrast, Chinese herbal medicine is of unknown safety for many medical conditions including MS. Activation of the immune

system, a theoretical risk for worsening MS antagonizing the therapeutic effects of immune-modulating and immune-suppressing medications, may be caused by multiple Chinese herbs, including Asian ginseng, astragalus, and maitake and reishi mushrooms[4,8,9]. Acupuncture as a low risk and moderately expensive component of TCM in MS treatment is not well studied, but based on other studies it may alleviate pain. In contrast, Chinese herbal therapy, also a moderately expensive therapy, is of unknown efficacy, its use poses a theoretical risk and should probably be avoided.

Bee Venom Therapy

Bee venom therapy is carried out by placing bees on specific body parts with tweezers. The aim is to accomplish a bee sting. The highest quality clinical trial of bee venom therapy in MS was a randomized crossover study in 26 patients with relapsing-remitting or secondary progressive MS[10]. This study showed that bee venom therapy did not produce any beneficial effects regarding MS activity, attack frequency, neurologic disability, fatigue, and overall quality of life. As a therapeutic method, it is a well-tolerated method with imperceptible eventuality of anaphylaxis. Moreover, bee stings around the eye, which are sometimes claimed to relieve MS-related visual problems, should be avoided because they may actually cause optic neuritis[11]. Bee venom therapy, a low to moderate cost and generally safe therapy, is ineffective therapy in the treatment of patients with MS[12].

Dietary Supplements

Antioxidants

Because of the assumption that free radical-induced oxidative damage may play a role in myelin and axonal injury in MS, it is sometimes claimed that antioxidants should be used as the treatment of patients with MS. Many antioxidant compounds activate T cells, macrophages and other immune cells, thus they pose theoretical risks in MS. However, in experimental allergic encephalomyelitis, multiple antioxidant compounds have produced therapeutic effects[13,14]. Small short-term MS clinical trials with various antioxidants such as inosine[15], alpha-lipoic acid[16], and a combination of selenium and vitamins C and E[17] indicate that these approaches are well tolerated. Until now, there are no quality studies that could with certainty provide evidence for the efficacy of antioxidant therapy in the treatment of MS patients. Hence, antioxidants represent an inexpensive means of MS treatment with possible, but also not fully proved, therapeutic effects.

Cranberry

An MS-associated bladder dysfunction can frequently cause urinary tract infection (UTI). Cranberry may prevent UTI through a novel mechanism of action in which herb constituents inhibit bacterial adhesion to the uroepithelium[9]. Multiple studies indicate that cranberry may prevent UTI, but there is no evidence that cranberry should be used for treating UTI[18]. It is important to accentuate that UTI may cause pseudoexacerbations that should be recognized by clinicians and promptly treated with antibiotics and not cranberries. Cranberry is a low-risk, inexpensive and generally well tolerated therapy, except for the fact that it may increase the anticoagulant effect of warfarin and in long-term use it may increase the risk of kidney stones. It should only be used to prevent and not to treat UTI.

Echinacea, ginseng and other 'immune-stimulating' supplements

Echinacea, alfalfa, ashwagandha *(Withania somnifera),* ginseng, astragalus, cat's claw, garlic, maitake and shiitake mushrooms, mistletoe, stinging nettle, melatonin and zinc[19] are the supplements the effects of which on the activation of T cells or macrophages were only studied *in vitro* or on animal models. Ginseng is one of the most extensively studied herbal products in the scientific literature[20]. The known active constituents of Asian ginseng are the ginsenosides with an antioxidant activity and many other effects. Despite uncertainty about its mechanism of action, a limited number of placebo-controlled trials have suggested that ginseng is capable of decreasing fatigue in MS patients. Immune-stimulating supplements pose theoretical risk in MS. Although ginseng extracts appear to be safe, large doses can cause side effects such as hypertension, nervousness, irritability, insomnia, rash and diarrhea. Five different animal models using conventional toxicological methods report no acute or chronic toxicity of the extract[21]. Echinacea may also

increase the hepatotoxicity of medications, which include some MS medications such as interferons and methotrexate[19].

Ginkgo biloba

Ginkgo biloba, derived from the leaf of the Ginkgo biloba tree, is also one of the traditional Chinese medicine treatments that have been used for centuries in China. It could have not only symptomatic but also disease-modifying effects in MS because of its anti-inflammatory and antioxidant effects. Some studies in experimental allergic encephalomyelitis indicate that ginkgo decreases disease severity[16]. In small clinical trials in MS, ginkgo improved cognition[22] and fatigue[23], but it does not appear to be effective for treating MS attacks[24]. Ginkgo is generally well tolerated but since it has anticoagulant effects and may rarely provoke seizures, it should be avoided or used with vigilance by patients with seizures and those who take antiplatelet or anticoagulant medications, are undergoing surgery, or have coagulopathies. It can also cause dizziness, headaches, rashes, nausea, vomiting, diarrhea, and flatulence[25]. It is an inexpensive therapy that possibly may improve fatigue and cognitive dysfunction.

St. John's wort

In the past, St. John's wort was used to treat depression, which is a very usual MS symptom. It appears to be effective for the treatment of mild-moderate, but not severe depression. St. John's wort may cause fatigue, photosensitivity, and may alter the levels of many medications including anticonvulsants, warfarin (Coumadin), antidepressants and oral contraceptives. It is usually an inexpensive and well tolerated herb[25,26].

Vitamin B_{12}

It is sometimes claimed that vitamin B_{12} supplements are an effective MS therapy[5]. There is no evidence demonstrating that vitamin B_{12} supplements provide clinically significant therapeutic effects to patients with MS generally[27]. A small subset of patients with MS that have vitamin B_{12} deficiency require vitamin B_{12} supplementation. Vitamin B_{12} supplementations, administered intramuscularly or orally, are generally safe, inexpensive and well tolerated. They rarely cause rashes, itching and diarrhea[25].

Vitamin D

Vitamin D is a group of fat-soluble prohormones, the two major forms of which are vitamin D_2 (or ergocalciferol) and vitamin D_3 (or cholecalciferol). Since the MS patients are at risk of developing osteopenia and osteoporosis, vitamin D is important for maintaining bone density[28]. Also, since vitamin D has an important immune-regulating role, it could exert disease-modifying effects in MS[29]. Some studies indicate that low vitamin D levels and low vitamin D intake are associated with an increased risk of developing MS[30]. Definitive well-designed trials of vitamin D supplementation as a preventive remedy in MS have not been reported. Vitamin D is a low-cost and generally well-tolerated therapy. In high doses, it may cause fatigue, abdominal cramps, nausea, vomiting, renal damage, hypertension, and other side effects. The tolerable upper intake level of vitamin D is 2000 international units (IU) daily. The adequate intake of vitamin D is 200 to 600 IU daily[25].

Diet

Swank diet and other diets enriched with polyunsaturated fatty acids

The most often used CAM therapies among MS patients include diet and omega-3 fatty acids (FAs). They may have potential benefit in MS as they have immunomodulatory and neuroprotective properties when evaluated in animal models, as well as in MS patients and in other chronic disease conditions. They also appear to have a high safety profile when used at recommended doses.

Swank and Dugan dietary strategy is based on low intake of saturated fat. On the basis of clinical trial, this strategy has been reported to have therapeutic effects in MS, but the trial was not controlled, blinded, or randomized[31].

Omega-3 FAs and omega-6 FAs are a family of polyunsaturated FAs (PUFAs). Three randomized controlled trials studied the use of omega-6 supplements. Two of these trials found a statistically significant reduction in MS attack severity and duration. Data from all three trials demonstrated therapeutic

effects on disability progression in subjects with mild MS at the start of the trial[32]. The most rigorous investigation of omega-3 supplementations in MS was a large, randomized, double-blind, controlled trial that did not find a statistically significant treatment effect[33]. One small randomized trial of omega-3 FA supplements in combination with glatiramer acetate or interferons reports a trend of improved physical and emotional functioning in study subjects taking omega-3 FAs[34]. Preparations of fish oil, a rich source of omega-3 FAs, are generally well tolerated and safe. However, the safety of long-term supplementation with other omega-3 FAs and all omega-6 FAs is not known. Omega-6 FAs may elevate triglyceride levels and may rarely provoke seizures. Some omega-3 and omega-6 FAs may have mild anticoagulant effects. Also, supplementation with PUFAs may cause vitamin E deficiency. Thus, supplementation of vitamin D may be necessary[25]. Although these dietary approaches have produced suggestive results in MS clinical trials, they should not be used instead of conventional disease-modifying medications.

Hyperbaric Oxygen

Hyperbaric oxygen (HBO) has a reputation as an effective treatment for many diseases including MS. In practice, however, it is approved only for the treatment of burns, severe infections, carbon monoxide poisoning, and decompression sickness. Multiple subsequent studies did not generally find significant therapeutic effects. Although HBO is usually well tolerated, it may produce mild visual symptoms and some rare adverse effects like cataracts, seizures, pressure injury to the ear, and pneumothorax[6]. Because of its high cost and no therapeutic effects in MS, at this time, routine treatment of MS with HBO is not recommended[35].

Low Dose Naltrexone

In MS, there have been statements that low oral doses of naltrexone (LDN), which is an opiate antagonist, alleviate symptoms, prevent attacks, and slow down disability progression. However, there are no quality studies to support such statements. Preliminary report of an 8-week study in 80 patients with relapsing or progressive MS states that LDN had no effect on physical functioning but it had some favorable effects on pain and mental health[36]. Another 6-month open-label study of LDN in 40 people with primary progressive MS found that its use improved spasticity, worsened pain, and had no effects on fatigue, depression and overall quality of life[37]. LDN is moderately expensive and generally well tolerated, but further studies are needed to determine with certainty its effectiveness in MS.

Cannabis (Marijuana)

The majority of controlled studies have evaluated cannabinoids for spasticity in MS. The major psychoactive constituent in cannabis is δ-9-tetrahydrocannabinol (THC). Cannabidol (CBD) is a non-psychoactive constituent in cannabis and is the major constituent in the plant. It is thought to decrease the clearance of THC by affecting liver metabolism. In a review of six controlled studies evaluating a combination of THC and CBD for spasticity in MS, it was found that THC-CBD was well tolerated and improved patient self-reports of spasticity. Objective measures did not show significant improvement compared with placebo[38]. Several studies of variable quality showed that Sativex (an oral form of cannabis) relieved pain, spasticity and sleeping difficulties[39]. Marijuana has many possible side effects such as sedation, seizures, nausea, vomiting, incoordination, poor pregnancy outcomes, impaired lung function, and increased risk of cancer of the head, neck and lung[8]. Besides, it is illegal in many countries.

Tai Chi

Tai chi as part of the TCM has been practiced for centuries in China. Multiple sclerosis as a disease of the CNS[40] through various symptoms has negative effects on the MS patients' quality of life. Small non-blinded trials of tai chi in MS have displayed suggestive therapeutic effects on spasticity, walking, and social and emotional functioning, in one word, on the quality of life[41]. Tai chi is a low-moderate cost and generally safe therapy. Because of the risk of falling, straining joints and muscles, it should be modified or avoided by those patients who have severe osteoporosis, bone fractures, acute low back pain, and joint injuries[5].

Yoga

Yoga implies a widely prevailing practice of physical postures or poses that were developed in India thousands years ago. One randomized controlled trial emphasized that patients who practiced yoga or did conventional exercise experienced significantly less fatigue[42]. Yoga is generally well tolerated, but it should be modified or avoided by pregnant women and those patients with gait instability, fatigue, heat sensitivity, or significant lung, heart or bone failures[9].

Conclusion

The use of CAM, in addition to conventional medical treatments, for treating such a complex disease requests careful consideration. The well-designed clinical studies of many CAM therapies are often lacking, therefore the safety and effectiveness of many CAM therapies are uncertain. Within the context of MS, some therapies may possibly be helpful, and some of them are poorly studied, potentially maleficent or inefficient. Patients often use many therapeutic methods and supplements from the domain of CAM. However, their knowledge about the efficacy and side effects of those therapies is insufficient. So, it is important that neurologists and other conventional health professionals have sufficient knowledge of the CAM topic, so they could have a positive participating role in the care and treatment of patients with MS by differentiating CAM therapies that may have reasonable efficacy-safety profiles from those that are unstudied, ineffective and dangerous.

References

1. What is Complementary and Alternative Medicine? National Center for Complementary and Alternative Medicine, 2010. Accessed August 5, 2010 at http://nccm.nihgov/health/whatiscam/
2. Complementary and Alternative Medicine in the United States. National Academy Press. ISBN 978-0-309-09270-8. Institute of Med (2005). http://www.nap.edu/catalog.php?record_id=11182.
3. YADAV V, SHINTO L, BOURDETTE D. Complementary and alternative medicine for the treatment for multiple sclerosis. Expert Rev Clin Immunol 2010;6(3):381-95.
4. Complementary and Alternative Medicine in the United States. David Nemer. ImproveHealthCare.org. November 2010. Accessed at: http:improvehealthcareorg.
5. BOWLING AC. Complementary and alternative medicine in multiple sclerosis. Continuum Lifelong Learning Neurol 2010;16 (5):78-86.
6. BOWLING AC. Unconventional medicine and multiple sclerosis: the role of conventional health providers. In: LUCCHINETTI CF, HOHLFELD R, editors. Multiple sclerosis 3 (Blue Books of Neurology series). Philadelphia, PA: Saunders, 2010;355-70.
7. NIH Consensus Development Panel on Acupuncture. JAMA 1998;280(17):1518-24.
8. BOWLING AC, STEWART TM. Dietary supplements and multiple sclerosis: a health professional's guide. New York, NY: Demos Medical Publishing, 2004.
9. BOWLING AC. Complementary and alternative medicine and multiple sclerosis. New York, NY: Demos Medical Publishing, 2007.
10. WESSELIUS T, HEERSEMA DJ, MOSTERT JP *et al.* A randomized crossover study of bee sting therapy for multiple sclerosis. Neurology 2005;65(11):1764-8.
11. SONG HS, WRAY SH. Bee sting optic neuritis: a case report with visual evoked potentials. J Clin Neuroophthalmol 1991;11(1):1145-9.
12. CASTRO HJ, MENDEZ-LNOCENCIO JI, OMIDVAR B *et al.* A phase I study of the safety of honeybee venom extract as a possible treatment for patients with progressive form of multiple sclerosis. Allergy Asthma Proc 2008;26(6):470-6.
13. MARACCI GH, JONES RE, McKEON GP, BORDETTE DN. Alpha lipoic acid inhibits T cell migration into the spinal cord and suppresses and treats experimental autoimmune encephalomyelitis. J Neuroimmunol 2002;131(1-2):104-14.
14. SCOTT GS, SPITSIN SV, KEAN RB *et al.* Therapeutic intervention in experimental allergic encephalomyelitis by administration of uric acid precursors. Proc Natl Acad Sci USA 2002;99(25):16303-8.
15. SPITSIN S, HOOPER DC, LEIST T *et al.* Inactivation of peroxynitrite in multiple sclerosis patients after oral administration of inosine may suggest possible approaches to therapy of the disease. Mult Scler 2001;7(5)313-9.
16. YADAV V, MARACCI G, LOVERA J *et al.* Lipoic acid in multiple sclerosis: a pilot study. Mult Scler 2005;11(2):159-65.
17. MAI J, SORENSON P, HANSEN J. High dose antioxidant supplementation to MS patients: effects on glutathione peroxidase, clinical safety, and absorption of selenium. Biol Trace Elem Res 1990;24(2):109-17.
18. HESS MJ, HESS PE, SULLIVAN MR *et al.* Evaluation of cranberry tablets for the prevention of urinary tract infections in spinal cord injured patients with neurogenic bladder. Spinal Cord 2008;46(9):622-6.
19. BOWLING AC, STEWART TM. Current complementary and alternative therapies of multiple sclerosis. Curr Treat Options Neurol 2003;5(1):55-68.

20. BLUMENTHAL M. Asian ginseng: potential therapeutic uses. Adv Nurse Pract 2001;9:26-8.
21. LEE J, ZHAO Y, LIAND X-J. Current evaluation of the millennium phytomedicine – Ginseng (II): collected chemical entities, modern pharmacology, and clinical applications emanated from traditional Chinese medicine. Curr Med Chem 2009;16:2924-42.
22. LOVERA J, BAGERT B, SMOOT K *et al*. Ginkgo biloba for the improvement of cognitive performance in multiple sclerosis: a randomized placebo-controlled trial. Mult Scler 2007;13(3):376-85.
23. JOHNSON SK, DIAMOND BJ, RAUSCH S *et al*. The effect of ginkgo biloba on functional measure in multiple sclerosis: a pilot randomized controlled trial. Explore (NY) 2006;2(1):19-24.
24. BROCHET B, GUINOT P, ORGOGOZO J *et al*. Double blind, placebo controlled, multicentre study of ginkolide B in treatment of acute exacerbations of multiple sclerosis. The Ginkolide Study Group in multiple sclerosis. J Neurol Neurosurg Psychiatry 1995;58(3):360-2.
25. JELLIN JM, GREGORY PJ, BATZ F *et al*. Natural medicines comprehensive database (pharmacist's letter/prescriber's letter). 8th edn. Stockton, CA: Therapeutic Research Faculty, 2006;2010.
26. WERNEKE U, HORN O, TAYLOR DM. How effective is St John's wort?: the evidence revisited. J Clin Psychiatry 2004;65(5):611-7.
27. WADE DT, YOUNG CA, CHAUDHURI KR, DAVIDSON DL. A randomized placebo controlled exploratory study of vitamin B-12, lofepramine, and L-phenylalanine (the "Carl Loder regime") in the treatment of multiple sclerosis. J Neurol Neurosurg Psychiatry 2002;73(3):246-9.
28. WEINSTOCK-GUTTMAN B, GALLAGHER E, BAIER M *et al*. Risk of bone loss in men with multiple sclerosis. Mult Scler 2004;10(2):170-5.
29. SMOLDERS J, DAMOISEAUX J, MENHEERE P. Vitamin D as an immune modulator in multiple sclerosis, a review. J Neuroimmunol 2008;194(1-2):7-17.
30. MUNGER KL, LEVIN LI, HOLLIS BW *et al*. Serum 25-hydroxyvitamin D levels and risk of multiple sclerosis. JAMA 2006;296(23):2832-8.
31. SWANK R, DUGAN B. Effect of low saturated fat diet in early and late cases of multiple sclerosis. Lancet 1990;336(8706):37-9.
32. STEWART TM, BOWLING AC. Polyunsaturated fatty acid supplementation in MS. Int MS J 2005;12(3):88-93.
33. BATES D, CARTLIDGE N, FRENCH J *et al*. A double-blind controlled trial of long chain n-3 polyunsaturated fatty acids in the treatment of multiple sclerosis. J Neurol Neuorsurg Psychiatry 1989;52(1):18-22.
34. WEINSTOCK-GUTTMAN B, BAIER M, PARK Y *et al*. Low fat dietary intervention with omega-3 fatty acid supplementation in multiple sclerosis patients. Prostaglandins Leukot Essent Fatty Acids 2005;3(5):392-404.
35. BENNETT M, HEARD R. Hyperbaric oxygen therapy for multiple sclerosis. CNS Neurosci Ther 2010;16(2):115-24.
36. CREE BAC, KRONYEYEVA E, GOODIN DS. Pilot trial of low dose naltrexone and quality of life in MS. Ann Neurol 2010;9999(999A).
37. GIRONI M, MARTINELLI-BONESCHI F, SACERDOTE P *et al*. A pilot trial of low-dose naltrexone in primary progressive multiple sclerosis. Mult Scler 2008;14(8):1076-83.
38. ZAJICEK JP, SANDERS HP, WRIGHT DE *et al*. Cannabinoids in multiple sclerosis (CAMS) study: safety and efficacy data for 12 month follow up. J Neurol Neurosurg Psychiatry 2005;76:1664-9.
39. BARNES MP. Sativex: clinical efficacy and tolerability in the treatment of symptoms of multiple sclerosis and neuropathic pain. Expert Opin Pharmacother 2006;7(5):607-15.
40. BAŠIĆ-KES V, BOŠNJAK-PAŠIĆ M, DEMARIN V. Pain syndromes in patients with multiple sclerosis. Acta Clin Croat 2007;46:331-3.
41. HUSTED C, PHAM L, HEKKING A, NIEDERMAN R. Improving quality of life for people with chronic conditions: the example of t'ai chi and multiple sclerosis. Altern Ther Health Med 1999;5(5):70-4.
42. OKEN BS, KISHIYAMAS, ZAJDEL D *et al*. Randomized controlled trial of yoga and exercise in multiple sclerosis. Neurology 2004;62(11):2058-64.

Sažetak

ULOGA KOMPLEMENTARNE I ALTERNATIVNE MEDICINE U TERAPIJI MULTIPLE SKLEROZE

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Nacionalni centar za komplementarnu i alternativnu medicinu u Sjedinjenim Američkim Državama definira komplementarnu i alternativnu medicinu kao skupinu različitih medicinskih i zdravstvenih sustava, praksa i proizvoda koji se općenito ne smatraju dijelom konvencionalne medicine. Multipla skleroza je kronična onemogućavajuća bolest središnjeg živčanog sustava koja se javlja u mlađoj odrasloj dobi. Unatoč mnogim istraženim i odobrenim lijekovima mogućnosti liječenja multiple skleroze su ipak ograničene. Zbog toga mnogi bolesnici koji boluju od multiple skleroze istražuju djelovanja metoda iz okvira komplementarne i alternativne medicine ne bi li postigli bolju kontrolu bolesti te smanjili simptome iste. Istraživanja ukazuju na to da je do 70% bolesnika oboljelih od multiple skleroze u tijeku liječenja bolesti isprobalo jednu ili više metoda iz okvira komplementarne i alternativne medicine. Većina oboljelih od multiple skleroze koji su koristili metode komplementarne i alternativne medicine navodi da su iskusili neke povoljne učinke. Najčešće korištene metode komplementarne i alternativne medicine su dijeta, omega-3 masne kiseline i antioksidansi. Među metode koje bi mogle imati najviše potencijala u terapiji multiple skleroze, a za koje su potrebna daljnja istraživanja, ubrajaju se dijeta s malim udjelom masnoće, omega-3 masne kiseline, lipoična kiselina i nadomjesci vitamina D kao sredstva s protuupalnim i neuroprotektivnim djelovanjem kako u relapsnom, tako i u progresivnom obliku multiple skleroze. Dosad je provedeno nedovoljno istraživanja koja su za cilj imala procjenu sigurnosti i učinkovitosti komplementarne i alternativne medicine u liječenju multiple skleroze. Upravo zbog toga posljednjih nekoliko godina Nacionalno društvo za multiplu sklerozu aktivno podupire istraživanja u ovom vrlo važnom području.

Ključne riječi: *Antioksidansi; Komplementarne terapije; Prehrambeni dodaci; Masne kiseline, esencijalne; Dijeta sa smanjenim udjelom masnoća; Multipla skleroza*