ACUPUNCTURE IN THE TREATMENT OF PAINFUL DIABETIC NEUROPATHY

By

Brianna J. Schlaich, BSN

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The members of the Committee appointed to examine the dissertation/thesis of Brianna Schlaich find it satisfactory and recommend that it be accepted.

Mel Halverson 4-4-11
(Chair)

C. Corbett 4-4-11

Denise Smart 4-5-11
Diabetic peripheral neuropathy (DPN) is the most common cause of peripheral neuropathy and affects up to one third of patients with diabetes. The pathophysiology of DPN is unknown, making it difficult to treat. Pharmacological treatments have limited efficacy and substantial side effects. Acupuncture has been practiced for thousands of years in China and other Asian countries and is accepted by Western culture as a complimentary therapy for pain relief. Though further research is needed, existing studies evaluating acupuncture as a treatment for DPN look promising. With a positive risk-benefit ratio compared to other available treatments, acupuncture is a viable treatment option for DPN. The purposes of this paper are to review the literature on the use of acupuncture for the treatment of DPN and to offer recommendations for nurse practitioners in the United States. This paper examines the literature on (1) the disease characteristics and management of DPN, (2) the physiology and use of acupuncture in Eastern and Western health care, and (3) the evidence supporting the effectiveness of acupuncture for the treatment of peripheral neuropathy and DPN. Recommendations for nurse practitioners in the United States and for further research are then discussed.
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INTRODUCTION

Diabetic peripheral neuropathy (DPN) occurs in up to one third of adults with type 1 and 2 diabetes and substantially impacts quality of life (Corbett, 2005). Diabetic neuropathy is defined as “a noninflammatory disease process associated with diabetes mellitus and characterized by sensory and/or motor disturbances in the peripheral nervous system” (Mosby, 2006, p. 552). Common symptoms of diabetic neuropathy are numbness, tingling, reduced reflexes, and pain, often described as burning, muscle cramps, and increased pain response to touch (Corbett, 2005). The pathogenesis of DPN is not well understood, making it difficult to treat. Some of the proposed mechanisms of the development of DPN include oxidative, osmolar, or ischemic damage to nerve cells in persons with diabetes, all which are thought to be related to hyperglycemia (Stevens, Obrosova, Pop-Busui, Greene, & Feldman, 2003). Glycemic control is the first-line therapy for treating patients with DPN, but it may not reverse existing symptoms (Tavakoli et al., 2008).

Pharmacological treatment available in the United States (U.S.) has shown only to reduce, but not totally eradicate in most persons, the painful symptoms of DPN. Common pharmacological treatment of includes antidepressants, anticonvulsants, and opioids. Non-steroidal anti-inflammatory agents have also been used with limited efficacy reported. Studies have shown that people obtain moderate relief with the above medications, but limit their use due to side effects. Significant side effects such as dry mouth, tiredness, somnolence, headache, orthostatic hypotension, dizziness, gastrointestinal effects, and peripheral edema may occur (Corbett, 2005).

There are several non-pharmacological treatment options for DPN including infrared therapy, electrical stimulation, polyurethane film dressings, and acupuncture (Corbett, 2005).
Several challenges have plagued the adoption of acupuncture in Western medicine for specific disease processes such as DPN. The 2007 National Health Interview Survey found that approximately 3.1 million U.S. adults had received acupuncture in the previous year though scientific evidence for the efficacy of its use is limited (National Center for Complementary and Alternative Medicine, 2010).

Acupuncture is “the Chinese medical art of inserting fine needles into the skin to relieve pain or disability” (Wensel, 1980, p. 5). Acupuncture has been practiced for thousands of years in China and other Asian countries (Ahn & Kaptchuk, 2005). It gained recognition in the U.S. after 1972 when President Nixon visited China and witnessed how effective acupuncture can be in relieving pain. Acupuncture is likened to martial arts in diversity of styles. At least eight different types of acupuncture are taught in the U.S. and acupuncture points used by acupuncture providers can vary greatly depending on patient presentation and symptoms (Ahn & Kaptchuk, 2005).

Another challenge to acupuncture gaining acceptance in Western culture is the different approach to disease diagnosis and management between Eastern and Western medicine. Eastern medicine defines disease in terms such as “stomach fire” and “kidney fire” and attributes disease to the failure of a part of the body to receive “qi,” or “the vital energy of the human body” (Ahn & Kaptchuk, 2005; Mosby, 2006). The exact mechanism of action of acupuncture is unknown. One of the proposed mechanisms is the stimulation of nerve fibers in muscle tissue triggering the release of neurotransmitters (Wang, Kain, & White, 2008). This proposed mechanism of action appears to coincide with some of the proposed pathophysiologic mechanisms of DPN.

Acupuncture is growing in popularity as a complementary alternative therapy in the U.S. due to the ineffective ability of pharmacotherapy and alternative treatments to manage painful,
unremitting symptoms. Complementary therapies are defined as a set of systems including diagnostic, treatment, and prevention based on techniques and philosophies other than conventional Western Medicine, often from non-Western cultures, that are used in addition to conventional Western practice (Mosby, 2007). The physiological effects of acupuncture, the use of acupuncture in Eastern and Western health care, and evidence for the effectiveness of acupuncture of the treatment of peripheral neuropathy and DPN are now described in detail.

LITERATURE REVIEW

The literature review begins with a description of the search strategies utilized to find information to accomplish the purpose of the paper. The review then proceeds to describe the theoretical framework selected to guide the conceptual foundation for the paper. The review concludes with a critical evaluation of the literature. The search strategies resulted in the organization of the literature review into five sections including DPN pathophysiology and treatment overview, acupuncture physiology and use, acupuncture and peripheral neuropathy, Western studies of DPN and acupuncture, and Chinese studies of DPN and acupuncture.

Search Strategies

Finding evidence for DPN pathophysiology and treatment consisted of four searches. For DPN pathophysiology specifically, the PubMed online search key words used were DPN etiology and pathophysiology with a limit set to review articles available in English. Six articles were reviewed and one was chosen based on date written and relevancy to subject. One text was obtained from the WSU Riverpoint campus library to better understand the etiology of DPN. To locate articles on the treatment of DPN, Pub Med was used with the MeSH major heading, diabetic neuropathies AND pain, yielding 193 articles. Two articles were chosen based on their comprehensive explanation of treatment and the inclusion of acupuncture as a possible therapy.
To examine the physiology of acupuncture, Pub Med, was used with the key words *acupuncture mechanism of action* limited to review articles in English. Four articles were reviewed and one chosen based on relevance to subject. Medscape was searched with the key words *acupuncture and diabetic neuropathy*. Thirty articles were reviewed and one was used based on its comprehensive review of the use of acupuncture in Western medical practice. To find research articles reviewing the efficacy of acupuncture on DPN, a number of databases were searched as few relevant studies of DPN and acupuncture exist. These databases included Pub Med, CINAHL, and Google Scholar. Other databases, including AMED, Alt Health Watch, and Natural Standard were searched with the assistance of a librarian at Bastyr University in Seattle. Keywords used were *diabetic neuropathy and acupuncture, diabetes and acupuncture, peripheral neuropathy and acupuncture*, with searches limited to research articles on human subjects and available in English. A total of 24 articles were reviewed and eight were chosen based on full text availability and focus of acupuncture and DPN. One article was retained from this search due to its relevance to acupuncture and peripheral neuropathy in general, though it did not review DPN specifically.

**Theoretical Framework**

The theory that most applies to DPN and acupuncture is the Theory of Symptom Management, developed by Marylin Dodd and colleagues at the University of California at San Francisco (Dodd, et al., 2001). This middle range, empirically tested theory holistically evaluates the factors that influence how people perceive and manage symptoms. The theoretical model is composed of three components: symptom experience, symptom management strategies, and outcomes (See Figure 1).
Symptom management strategies are used to prevent, delay, or manage a deleterious outcome of a symptom. The symptom experience component consists of an individual’s perception, evaluation, and response to symptoms. The symptom management strategies component of the theory asks a number of questions: what, when, where, why, how much, to whom, and how is a symptom strategy employed. Symptom outcomes are multidimensional. The outcomes include functional status, emotional status, self-care, costs, quality of life, morbidity, co-morbidity, and mortality. These three components of symptom management are affected by three contextual domains: person, including demographics, psychological, sociological, physiological, and developmental factors; environment, including physical, social and cultural factors; and health and illness, including risk factors, health status, disease and injury.

Acupuncture can be described as a symptom management strategy for DPN. Acupuncture should be delivered by a licensed acupuncturist in a clinical setting, with the number of sessions determined by the acupuncturist and person suffering from unpleasant symptoms of DPN. It can be hypothesized that the failure to manage symptoms by pharmacotherapy results in intractable DPN pain which, in turn, leads to the search for alternative symptom management strategies,
such as acupuncture. The success or failure of any given management strategy affects one or
more symptom outcomes such as quality of life, functional status, morbidity, and emotional
status. This model allows for a circular process of selecting a management strategy,
implementing and evaluating its success, and selecting another strategy if a poor outcome is
experienced, and so forth.

**DPN Pathophysiology and Treatment Overview**

**DPN pathophysiology.** Several pathophysiological mechanisms have been used to
explain DPN. Stevens, et al. (2003) explored a variety of mechanisms for the pathogenesis of
DPN. The authors found that neuropathy is linked to severity and duration of hyperglycemia and
the effect is similar in both type 1 and type 2 diabetes. They attribute neuropathy to a loss of
myelinated large fibers through a variety of mechanisms. There has been evidence of increased
oxidative stress on nerve fibers (Stevens, et al., 2003). There is also osmotic stress, which may
be linked to programmed cell death of the neurons. Another theory noted was an altered COX
pathway that is also linked with programmed cell death (Stevens, et al., 2003). Altered nerve
conduction and increased intracellular sodium were found in nerve cells in the presence of
hyperglycemia. Nerve ischemia from occlusion of microvasculature can occur, resulting in
neuronal damage. Alteration in growth factors that normally regulate the phenotype of the
neurons and what neurotransmitters are released was also discussed as a contributor to DPN.
Because the strongest link to damage was hyperglycemia, glucose control is considered the first
and most important treatment of DPN (Stevens, et al., 2003).

Woolf and Mannion (1999) investigated the pathophysiology and management of pain
related to DPN. The authors began by stating current medications commonly used have “limited
efficacy and undesirable side effects” (p. 1959). They continued to break down neuropathic pain
into five possible causes. The first was that sensory nerve sodium channels increase after injury, resulting in redistribution and hyperexcitability. This causes spontaneous firing of the channels. The authors discovered that there are two types of sodium channels affected: ones that are inhibited by a puffer fish toxin and ones that are not. The ones that are not inhibited are likened to pathological pain and are nociceptive in quality.

Woolf and Mannion (1999) also examined central and peripheral sensitization of the nervous system. Central sensitization can be expressed by enlargement where a stimulus will activate neurons, resulting in an exaggerated response to a regular stimulus, or painful response to a stimulus that would normally not cause pain (Woolf & Mannion, 1999). Alteration and increased availability of the N-methyl-D-aspartate (NMDA) receptors was noted. In peripheral sensitization, a decreased activation threshold, coupled with action potentials that can travel both ways in sensory receptors, results in abnormal neuronal discharge. The subsequent release of substance P and the sensitization of injured nerve terminals increases pain.

Another component discussed by Woolf and Mannion (1999) was decreased inhibitory control in the dorsal horn gateway of the spinal cord. Less gamma-Aminobutyricacid (GABA) and opioid receptors and increased excitatory substances such as glutamate cause spontaneous nerve transmission. The final theory explored by Woolf and Mannion (1999) was alpha receptor expression through sympathetic sprouting as a result of injury to C fibers. Their research revealed that sprouting of alpha fibers occurs in the lamina, resulting in a phenotypic switch where nerves receive input from non-noxious stimuli and interpret the input as noxious.

Considering the large variation in causes of neuropathic symptoms, Woolf and Mannion (1999) expressed the need for tools to measure the different types of nerve alterations and specific treatments that directly affect each of the pathways.
Tavakoli et al. (2008) reviewed possible pathophysiologic mechanisms for pain associated with DPN and discussed pharmacologic treatments. These investigators linked the pain with small C and A-delta nerve fiber damage, which produces hyperexcitability from hyperglycemia, alterations in ion channels, and sympathetic changes causing the nerves to be more sensitive to epinephrine and norepinephrine. Nerve conduction studies and vibration perception thresholds focus on large nerves and whereas warm and cold sensation zeroes in on the small nerve fibers damaged by DPN. The sensation measurements are more subjective and difficult to measure, however. The use of NSAIDS, tricyclic antidepressants, SSRIs, anticonvulsants, antiarrhythmics, opioids, and capsaicin cream as pharmacologic treatment options for DPN, including their side effects and variable efficacy was reviewed and summarized with overall recommendations made for pregabalin and duloxetine, which are both FDA approved. Finally, Takakoli et al. discussed nonpharmacologic therapies including electrical spinal cord stimulation, acupuncture, yoga, and psychological support; and stated that more research is needed for these methods.

**DPN Treatment.** Corbett (2005) evaluated pharmacologic and nonpharmacologic treatment options for DPN. The pharmacologic treatments were divided into disease-modifying and pharmacologic symptomatic treatments. The disease-modifying treatments were alpha-lipoic acid, evening primrose oil, near-infrared treatment (MIRE), and isosorbide dinitrate (ISDN) spray. The pharmacologic symptomatic treatments were analgesics including NSAIDS, controlled release oxycodone, and tramadol; antidepressants including tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), duloxetine, trazodone, and venlafaxine; anticonvulsants including gabapentin, lamotrigine, and pregabalin; and other treatments including capsaicin topical cream and mexiletine. Nonpharmacologic treatments reviewed were
electrical stimulation, acupuncture, magnet therapy, and polyurethane film dressings. The disease-modifying treatments looked promising in general, but more research is needed to evaluate their efficacy. The analgesics needed further research and either had side effects, making them difficult to use, or have the potential for dependency. Some of the antidepressants have shown benefit, but side effects limit their use. Capsaicin topical cream had side effects but may be effective. Mexiletine may have cardiac side effects. The nonpharmacologic treatments needed more research in general. Although Corbett (2005) conducted a comprehensive review of pharmacologic and nonpharmacologic treatments for DPN, she only reviewed two acupuncture articles, illustrating the scarcity of literature on the use of acupuncture for painful DPN.

Coats (2008) compared pharmacological interventions to acupuncture using a PICO (population, intervention, comparison, and outcome) structure that is popular in the evidence-based practice literature. Coats (2008) found that first-line pharmacological treatments included anticonvulsants, long acting opioids, and tricyclic antidepressants. Coats (2008) also found that these treatments are documented to be moderately effective in treating DPN symptoms, but have substantial side effects. The author stated that existing acupuncture research looks promising, but is lacking and no current literature compares pharmacologic treatment of DPN with acupuncture. Most of the article by Coats (2008) explained the evaluative methods of the PICO question with a brief discussion of findings. It did provide a good explanation of DPN and summary of side effects and efficacy of a few pharmacological therapies and acupuncture as possible treatments of DPN.

**Acupuncture Physiology and Use**

Wang, Kain, and White (2008) evaluated the science of acupuncture in medicine. The Chinese acupuncture theory focuses on the balance and flow of qi. Acupuncture points are
thought to be areas on the skin that connect with internal organs. Modern western technology has allowed for a more western scientific basis of the physiology of acupuncture. Positron emission computer tomography (PET), single-proton emission computer tomography (SPEC), and functional magnetic resonance imaging (fMRI) have shown physiologic changes in the limbic system of the brain during acupuncture; imaging changes believed to be associated with a person's perception of acupuncture. A-delta and C nerve fibers transmit signals to the spinal cord, causing biochemical release of endogenous opioid-like substances, and an analgesic effect is produced. This article stated that the National Institute of Health has evidence for efficacy of acupuncture in conditions such as pain, nausea, and vomiting.

Rapson and Banner (2008) provided an overview of acupuncture for pain management. The authors reported that needle insertion activates A-delta and C nerve fibers when using electro-acupuncture. These fibers transmit to the spinal cord, which releases neurotransmitters and sends signals to the midbrain, resulting in pain inhibition in the spinothalamic tract. Signals eventually reach the hypothalamus and pituitary, activating the release of adrenocorticotropic hormone and beta-endorphin. SPEC studies have shown activation of the limbic system, resulting in analgesia. Rapson and Banner (2008) discussed the safety of acupuncture. They stated that there is no cutting edge on the acupuncture needle and risk of serious adverse effects has been reported as 0.05 per 10,000 treatments. The worst reported adverse effect was pneumothorax. Transmission of mycobacterium abscessus bacteria was also found at a clinic that used multi-use acupuncture needles. Common adverse effects are bruising, minor bleeding, syncope, and temporary worsening of symptoms. According to Rapson and Banner (2008), there is no known absolute contraindication to acupuncture treatment. It is traditionally avoided in the first trimester of pregnancy due to unknown risk to the fetus. Rapson and Banner (2008) finally
discussed uses of acupuncture including the treatment of musculoskeletal pain, myofascial pain, back and neck pain, osteoarthritis, neuropathic pain, and cancer pain.

**Acupuncture and Peripheral Neuropathy**

Schroder, Liepert, Remppis, and Greten (2007) evaluated the effect of acupuncture on nerve conduction and subjective symptoms of idiopathic peripheral neuropathy. Research participants (n=47) were split into two groups; 21 received acupuncture in the experimental group and 26 received medical care in the control group, but no specific therapy for peripheral neuropathy. The acupuncture group had a mean age of 73 with nine males and 12 females with a mean duration of peripheral neuropathy of 16.73 months. The control group had a mean age of 67 with 13 males and 13 females and a mean duration of peripheral neuropathy of 25.33 months. The acupuncture group underwent 10 once-weekly acupuncture sessions. Seventy-six percent of participants in the acupuncture group showed an improvement of symptoms as measured by nerve conduction studies and subjective symptoms, 14% showed no effect, and 10% reported an aggravation of symptoms. In contrast, 15% of participants in the control group showed an improvement in symptoms, 27% showed no change, and 58% showed an aggravation of symptoms. This study excluded patients with known diabetes, so its results may not be generalizable to a population that uses acupuncture for painful DPN. Weaknesses of this study included lack of double blind design, failure to define subjective symptoms and what was considered good medical treatment in the control group. It did define the parameters for nerve conduction improvement or aggravation, had a small number of acupuncture sessions, and was a Western study, making the treatment and study more applicable to the U.S.
Western Studies of DPN and Acupuncture

Abuaisha, Costanzi, and Boulton (1997) evaluated the long term efficacy of acupuncture for treatment of 44 participants with diagnosed DPN. The sample’s characteristics were a mean age of 57.2 years, 32 males, 12 females, and a mean duration of diabetes of 13.2 years. Volunteer participants underwent six Traditional Chinese Medicine (TCM) acupuncture sessions over 10 weeks. Participants reported significant improvement in symptoms (77%), a reduction or stopping of medications for DPN (67%), complete symptom relief (21%), all without side effects. Additional acupuncture was delivered to 24% of participants to treat symptoms in the long term follow up period. The study did not find a correlation among reported efficacy of acupuncture, age of participants, how long they had experienced DPN, their vibration perception threshold, and neuropathy disability scores. Weaknesses of this study included the lack of a double blind design, failure to define primary and secondary symptoms, and the large number of males when compared to females. The study took place in the United Kingdom under a Western Medicine model of care, so the findings are easily translatable to U.S.

Ahn, Freeman, Hamdy and Kaptchuk (2007) evaluated Traditional Chinese Medicine (TCM) acupuncture and Japanese acupuncture for seven participants with DPN. The participants were randomized to two styles of acupuncture: three participants received TCM and four received Japanese acupuncture. The TCM sample characteristics included a mean age of 63 years, all had type 2 diabetes, a mean duration of diabetes of 13 years, a neuropathy mean duration of 2.8 years, a mean HgbA1c of 8.8, a Michigan neuropathy screening instrument mean score of 3.5, a pain rating index SF/MPQ mean score of 19, and an expectancy for acupuncture questionnaire mean score of one. Characteristics of the Japanese acupuncture group included a mean age of 58, two had type 1 diabetes, two type 2 diabetes, a mean duration of diabetes of 19
years, a mean duration of neuropathy of 6.9 years, a HgbA1c mean of 6.6, a Michigan Neuropathy Screening instrument mean score of 4.1, a pain rating index SF/MPQ mean score of 17.8, and an expectancy for acupuncture questionnaire mean score of 2.3. All participants received once-weekly treatments for 10 weeks. Both groups reported decreased pain severity scores; the TCM group showed improved quantitative sensory testing. One participant in the Japanese acupuncture group noted increased painful symptoms and discontinued treatment. This study had a very small sample size (N=7) and was split into two smaller groups, making the generalizability and validity of the findings highly speculative. The study lacked a double blind design. Measurement tools, results, and characteristics of participants were well displayed.

Walker (2001) published an article explaining her experiences as a nurse delivering acupuncture to patients in the Derbyshire Royal Infirmary in London. She reported some patients noted improved sensation, sleep and decreased pain. She also collected data of 40 patients treated in the clinic with an age range of 45-75 years after completing a two to three month course of acupuncture. Eighty-five percent reported improvement in pain, sleep, mobility, and mood; 10% reported improved sleep but no improvement in symptoms; and 5% were improperly diagnosed for DPN. The article did not define the research methods or measurement operations. It appeared biased in its conclusions of acupuncture efficacy, as the researcher delivered acupuncture herself. It summarized acupuncture for the treatment of DPN from a nurse specialist perspective in the United Kingdom and listed reported benefits.

Goodnick, Breakstone, Wen, and Kumar (2000) presented three case studies of patients with DPN who received nefazodone and six acupuncture sessions over eight weeks for DPN. The study measured pain, paresthesia, and numbness on visual analog scales and platelet 5-HT levels. Two of the three cases obtained benefit from acupuncture used in conjunction with
nefazodone and one obtained little benefit from acupuncture alone. Again, as with most studies, small sample size (N=3) limited the overall usefulness of the study findings. Goodnick et al. failed to explain the methods used, so the results can be interpreted as inconclusive.

**Chinese Studies of DPN and Acupuncture**

Zhang and Ye (2010) evaluated the clinical effects of acupuncture in a sample of 65 participants with DPN. Participants were randomized into two groups. Fifty five participants were randomized into two groups: a control group that received three two-gram treatments of oral inositol (n=33) and an acupuncture group that underwent five cycles of treatment for 14 days each, one treatment per day with cycles separated by four days (n=32). Participants in the acupuncture group reported themselves as markedly relieved or improved (87.5%) while 63.6% in the oral inositol group reported self-ratings of markedly relief or improvement. The study lacked a double blind design. The study also failed to define the tools used to measure treatment efficacy.

Yuan-zheng (2010) evaluated the efficacy of warm acupuncture for treatment of 26 subjects with DPN. Warm acupuncture in this study involved the lighting of moxa wool on the end of the acupuncture needles. Fifty-two participants were equally randomized into a control group that received a mecobalamin injection of 500 ug daily for four weeks (n=26) and an experimental group that received six acupuncture treatments weekly for four weeks (n=26). The mean age of the control group was 60.7 years, the mean duration of diabetes was 6.78 years, the mean DPN duration was 2.46 years, and mean fasting blood glucose was 10.88 mmol/L. The mean age of the acupuncture group was 61.0 years, the mean duration of diabetes was 7.13 years, the mean DPN duration was 2.47 years, and the mean fasting blood glucose was 10.54. Improved clinical symptoms, reflexes, and nerve conduction velocity were noted in 88.5% of the
acupuncture group and 61.5% in the control group. The study failed to define how it measured clinical symptoms and reflexes for efficacy. The study lacked a double blind design. Nerve conduction velocity findings were well displayed.

Hequn, Kuande, Xuemei, Wenxue, and Yongfen (2006) compared wrist and ankle acupuncture and body acupuncture to Chinese routine medical treatment of DPN. Ninety participants were randomly divided into three groups; Group I was treated with wrist-ankle acupuncture and consisted of 18 males and 12 females with a mean age of 63.3 and mean duration of DPN of 5.64 years; Group II was treated with body acupuncture and had 17 males and 13 females, with a mean age of 61.6 years and mean duration of DPN of 5.49 years; Group III was treated with routine medical treatment by Chinese standards (injections of B vitamins), and had 21 males and 9 females, with a mean age of 60.8 years and mean duration of DPN of 5.81 years. All treatments were given in three seven-day courses with two days in between courses. Over 56% of participants reported markedly relived symptoms and 36.67% had improved symptoms in Group I. Over 56% reported markedly relieved symptoms and 33.33% improved symptoms in Group II. Over 23% reported markedly relieved and 40% improved symptoms in Group III. Blood lipids, rheology (blood flow), fasting blood glucose, and nerve conduction, in addition to clinical symptoms, were used to evaluate efficacy of treatment of DPN, which may have skewed the results of diabetes changes versus DPN symptom changes. Group III had fewer females than the other two groups, and the operationalization of clinical symptoms was not defined. The settings were at two Chinese Medical School hospitals, limiting the generalizability to people in the U.S. Results were well documented and easy to track in this study.
SIGNIFICANCE FOR NURSING AND NURSE PRACTITIONERS

This section is composed of recommendation for nurse practitioners and recommendations for further research. Each is now described.

Significance for Nurse Practitioner Practice

DPN is difficult to treat and a common complaint of patients with diabetes, affecting patients’ “quality of life, sleep, mood, mobility, ability to work, interpersonal relationships, overall self worth, and independence” (Corbett, 2005, p. 523). Existing pharmacologic treatments have a number of side effects, limiting their use. Moreover, persons with diabetes are often on a number of medications to treat co-morbidities associated with the pathogenesis of diabetes (Corbett, 2005). Nurse practitioners can monitor these medications for undesirable interactions and for effectiveness.

The Theory of Symptom Management (Dodd et al., 2001) offers a useful model for nurse practitioners to evaluate how persons perceive, experience, and manage symptoms of painful DPN. The individual components of the model proffer information that the practitioner can use when conducting an assessment of the current and ongoing status of a person’s DPN. For example, if pharmacotherapy fails to manage painful neuropathy, nurses can assess if other alternative therapies have been tried. The practitioner can evaluate the effectiveness of these therapies and provide education about the risks and benefits of using alternative therapies. The contextual factors in the model provide practitioners with information from an ecological perspective, allowing for a multi-dimensional and holistic assessment and management of painful DPN.

Nurse Practitioners strive to provide a holistic approach to disease, including both pharmacological and non-pharmacological treatment options. Acupuncture appears to be a viable
treatment for DPN with a proposed physiologic mechanism of action that may coincide with the hypothesized pathophysiologic mechanism of DPN, namely small C fiber and A-delta fiber nerve damage. Evidence for a reduction in symptoms or complete symptom relief was observed between eight and 12 weeks of using acupuncture (Abuaisha, Costanzi, & Boulton, 1997; Ahn, Freeman, Hamdy & Kaptchuk, 2007; Walker, 2001; Goodnick, Breakstone, Wen, & Kumar, 2000).

Further anecdotal evidence for the safety and effectiveness of acupuncture for the treatment of painful DPN was obtained by the author. Four hours were spent with a clinical acupuncturist observing and discussing methods of acupuncture. Acupuncture clinics accredited by the National Certification Commission for Acupuncture and Oriental Medicine to treat DPN were consulted from Los Angeles, CA, Austin, TX, New York, NY, and Spokane, WA. The phone consultations consisted of a discussion of the general number of clients, cost of treatment, and insurance coverage of acupuncture sessions used to treat DPN. American acupuncturists interviewed agreed that an initial course of treatment with possible follow up sessions would be appropriate.

The most common adverse effects of acupuncture are mild and include minor bleeding, syncope, and temporary worsening of symptoms (Rapson & Banner, 2008). A study by Ewins, Bakker, Young, and Boulton (1993) reported painless ulcers that developed on the lower extremities of persons who had received acupuncture for their DPN. The acupuncture treatment utilized the burning of moxa wool on the end of the acupuncture needles. In light of this evidence, moxa should be avoided in persons with DPN who have areas of decreased circulation.

A potential benefit of acupuncture is improvement in symptoms without medication side effects. Given the mild common side effects and the avoidance of moxa, the evidence suggests
that the potential benefits of acupuncture outweigh the risks for the vast majority of persons with DPN. Acupuncture has become a first-line treatment option in some areas of the United Kingdom (Walker, 2001). Acupuncture is covered under complimentary therapies as a type of analgesia in some insurance plans in the U.S., defraying some of the cost (Washington State Healthcare Authority, 2011). Nurse practitioners should routinely check with the insurance carrier before referring someone for acupuncture therapy. Some communities have low-income acupuncture clinics that use a sliding scale for payment (K. Shaddox, personal communication, December 22nd, 2010). Acupuncture should be considered a symptom management treatment option for DPN in the U.S.

Summary

Evidence for the effectiveness and safety of acupuncture for the treatment of painful DPN was found in several of the articles reviewed. There are few of published research studies, however, so further research to evaluate acupuncture efficacy from a Western model of health care is required. The Western studies had research design weaknesses, e.g., small sample sizes and a lack of control groups. Further research should include controlled blinded studies that utilize “sham” or fake acupuncture as a placebo for control group participants. The study by Abuaisha et al., (1997) suggested that there may be minimal need for follow up sessions after initial treatment; however, additional research is needed to establish the long-term effectiveness of a cycle of acupuncture and the need, if any, for booster doses at some interval of time. The Chinese studies utilized an initial course of therapy for symptom relief and a much more rigorous acupuncture intervention. Importantly, minimal side effects were reported in these studies and all found acupuncture to be effective for a significant number of participants. Although a few studies reported improved sensation with acupuncture treatment, the evidence that supports the
reversibility of peripheral nerve damage is meager and equivocal. It is noteworthy that acupuncture is one of the only therapies currently known to improve the sensory deficits that characterize DPN. In summary, although more evidence is needed, acupuncture appears to be a promising treatment for DPN.
REFERENCES


