

USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE FOR WORK-RELATED PAIN CORRELATES WITH CAREER SATISFACTION AMONG DENTAL HYGIENISTS

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A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Dental Hygiene Education in the Department of Dental Ecology, School of Dentistry.

**Chapel Hill
2010**

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ABSTRACT

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Use of Complementary and Alternative Medicine for Work-Related Pain Correlates with
Career Satisfaction among Dental Hygienists
(Under the direction of Dr. Alice E. Curran)

The purpose of this study was to determine if Registered Dental Hygienists (RDHs) who use Complementary and Alternative Medicine (CAM) for chronic musculoskeletal pain (CMP) have greater career satisfaction than those who use Conventional Therapy (CT). An electronic survey was sent to ADHA members (N=2431) in NC and CA. Data were analyzed using univariate and bivariate analyses, and logistic regression. Of the respondents, 76.5% (n=472) suffered from CMP. CAM users reported greater overall health (79.3% vs. 54.0%, $p<0.001$) and career satisfaction (59.2% vs. 39.0%, $p<0.001$) when compared to CT users. In conclusion, CAM therapies may improve quality of life and career satisfaction for RDHs suffering from CMP.

ACKNOWLEDGEMENTS

I would like to thank my committee members Dr. Alice Curran, Dr. Gary Asher, Dr. Margot Stein, and Dr. Tabitha Tavoc for their guidance, knowledge, and hours they dedicated to supporting my research efforts. I also would like to thank Brian Stucky for his statistical expertise and Michelle Temple for her assistance with creating the electronic questionnaire in Qualtrics©. I would like to thank my classmates Katie, Jonathan, and Mary for working together as a team, and also for listening during the difficult times. And above all, I would like to give a special thanks to my parents Tom and Debi, and my sisters Nicholl and Jenna, for all of their support and generosity during my time here at UNC. Because of the huge support from everyone mentioned above, I was able to pursue my long-term goal of achieving my master's degree, as well as conduct research on a topic that I am very passionate about.

Supported by the American Dental Hygienists' Association Institute for Oral Health #09-01

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LIST OF ABBREVIATIONS

ADHA	American Dental Hygienists' Association
CA	California
CAM	Complementary and Alternative Medicine
CMP	Chronic Musculoskeletal Pain
IRB	Institutional Review Board
NC	North Carolina
NHIS	National Health Interview Survey
UNC	University of North Carolina
US	United States

INTRODUCTION

Physical stress is one of the leading etiologic factors in musculoskeletal disorders such as back pain, shoulder or neck tension, eyestrain, headaches¹ or carpal tunnel syndrome.^{1,2} In the same way, musculoskeletal disorders are an occupational risk for dental hygienists.³ Ninety-three percent² of dental hygienists recognize that their work causes and aggravates musculoskeletal pain.^{4,5} Dental hygienists have reported that “it’s an extremely physical job” and “it’s hard on one’s body.”⁴ For example, 69.5% of dental hygienists have reported musculoskeletal pain in the wrist/hand region, 68.5% in the neck region, and 67.4% in the upper back.²

There are many factors that contribute to musculoskeletal disorders in dental hygienists including repetitive motion, pinch-grasp, vibration, force, and awkward positions.^{2,5,6} Other factors leading to musculoskeletal disorders include: sitting for a long period of time, operator position, poor posture, lack of flexibility and strength, poor ergonomics, and insufficient work breaks.^{2,3,6,7}

Musculoskeletal disorders may interfere with the tasks involved in performing dental hygiene services. Many dental hygienists continue to work in pain due to financial constraints and as a result, many must decrease the number of days that they work.⁴ Dental hygienists have reported work stress and burn-out caused by the following contributing factors: musculoskeletal disorders, long working hours, and working without an assistant.⁸ Some have even chosen to leave the profession because of their musculoskeletal pain.^{4,9}

Chronic musculoskeletal pain is a problem among the dental hygiene population. Many studies have reported Complementary and Alternative Medicine (CAM) therapies, including yoga, massage, and acupuncture, to be effective in managing chronic musculoskeletal pain for the general population.¹⁰⁻¹⁶ Therefore, the purpose of this study was to determine if dental hygienists are using CAM therapies to manage their chronic musculoskeletal pain and also, to determine if CAM therapy use is associated with career satisfaction and longevity.

REVIEW OF THE LITERATURE

Location of Pain

Musculoskeletal pain occurs early during one's dental career, especially when including the educational training period. In Australia, dental hygiene students reported neck pain (64.3%), low back pain (57.9%), and shoulder pain (48.4%) early in their training.¹⁷ In the same way, a pilot study conducted in Connecticut among 82 dental hygiene students reported the following: 60.0% reported developing pain during their first year of training, and the proportion reporting pain increased to 70.0% for the second year of training; 46.0% reported upper extremity pain which increased to 62.0% after the 1st year and; 13.0% reported numbness/tingling in the hand which increased over 2 years of training. Numbness and tingling was significantly associated with the number of hours spent using a vibrating instrument as well as use of manual instruments.¹⁸ There is also evidence that dental hygiene students experience neck and shoulder pain irrelevant of their previous dental assisting experience. For example, dental hygiene students with no prior dental occupational experience, hygiene students with prior experience as dental assistants, and experienced dental hygienists (working for at least 5 years) completed a questionnaire on self-reported pain. Dental hygiene students with no prior experience reported neck pain (37.0%) for a median of 3.0 years and shoulder pain (11.1%) for a median of 5.0 years. Dental hygiene students who had prior experience as dental assistants at one time reported neck pain (43.2%) for a median of 3.0 years and shoulder pain (17.9%) for a median of 2.5 years. Experienced dental hygienists reported neck pain (72.3%) for a median of 9.5 years and shoulder pain

(35.1%) for a median of 5.0 years. Experienced dental hygienists were 2.3 times (95% CI=1.1-4.6) more likely to have some neck or shoulder pain compared to dental hygiene students. The number of hours cleaning teeth was significantly related to neck pain, while the amount of time polishing teeth was significantly related to shoulder pain.¹⁹

Work Disruptions

Musculoskeletal disorders cause work disruptions among dental hygienists,^{4,20,21} and most dental hygienists recognize that work causes or aggravates musculoskeletal symptoms.⁴ Physical discomfort has been reported to occur more frequently after 10 years of clinical practice when compared to 5 years.⁴ It has been reported that dental hygienists with musculoskeletal disorders worked more clinical hours and treated more patients per day compared to those who did not experience pain symptoms.²¹ Time pressures and lack of breaks have also been reported to have a physical impact on dental hygienists, who often lack control of their schedules.⁴

As a result of musculoskeletal discomfort, 31.0% of dental hygienists reported that they currently work less now compared to in the past,⁴ with hand and neck pain specifically causing a reduction in the number of work hours.²⁰ In another study, musculoskeletal discomfort caused 14.6% of dental hygienists to miss work, most frequently due to lower back (7.0%) and hand (7.0%) discomfort.²⁰ Even more, musculoskeletal discomfort has affected the median number of sick days taken among dental hygienists, such as those with pain had more sick days compared to those who did not experience pain (5 days vs. 2 days).²¹

Job Satisfaction among Dental Hygienists

In 2007, dental hygienists in the United States (U.S.) reported high job satisfaction, with 53.8% being very satisfied and 32.2% being somewhat satisfied in their current place of employment.²² Specifically, dental hygienists were most commonly satisfied with patient interactions (94.5%) and overall work hours (90.6%), and least satisfied with benefits (55.8%), number of work breaks (30.3%), and management skills of the dentist (26.0%).²⁰

Job satisfaction may have an impact on career longevity for dental hygienists. It has been reported that changes in the work environment may increase the career longevity of dental hygienists.²³ Other factors reported to influence career longevity for dental hygienists include the following: professional membership in the ADHA, building relationships with patients, taking CE courses on advanced topics in dental hygiene, and participating in activities outside of the office.⁴ According to a study among dental hygienists in Texas, career longevity is “primarily influenced by salary, followed by family responsibility, having a variety of duties, participation in decisions, professional collaboration, benefits, and a safe work environment.”²³ There are currently no reports that link musculoskeletal pain and career satisfaction among dental hygienists.

Strategies for Prevention of Chronic Pain for RDHs

Many dental hygienists report that their dental hygiene training did not prepare them for the physical demands that they faced when working full-time.⁴ Forty-nine percent of dental hygienists reported they had ergonomic training during their formal education compared to 21.0% of dental hygienists who reported having no ergonomic training.²⁰

Ergonomic training can reduce work related musculoskeletal disorders for dental hygienists.^{5,18} Proper ergonomics can improve neck postures by improving equipment, proper patient positioning, stretching, and technique training.¹⁹ In studies by Valachi and colleagues, prevention strategies of musculoskeletal disorders among dental auxiliaries include proper use of ergonomic equipment, frequent stretch breaks, maintaining lower back curve to reduce low back pain, using magnification loupes, adjusting operator chair properly, avoiding static postures, core strengthening with twenty minutes of aerobic exercise, and receiving education on musculoskeletal health and injury prevention.^{3,7}

Conventional Therapies for Treatment of Chronic Pain For RDHs

Many dental hygienists choose conventional therapies to help manage their chronic musculoskeletal pain. Conventional medicine is practiced by medical doctors (MD) or doctors of osteopathy (DO), and allied health professionals such as nurses or physical therapists.²⁴ The general population with chronic pain reported seeing their general practitioner (67.2%), hospital specialist (34.0%) and physical therapist (25.9%) for treatment. These individuals reported taking prescription medications (58.4%) and non-prescription medications (57.4%) as the severity of their pain increased.²⁵ Dental hygienists also reported using medications (NSAID's) and splints at night to help manage their chronic pain,⁴ although this study did not report its effectiveness. There are currently no reports of conventional therapy use as effective treatments for chronic pain among dental hygienists.

Use of Complementary and Alternative Medicine (CAM) Therapies for Chronic Musculoskeletal Pain

CAM therapies are defined as “a group of diverse health care systems and practices that are not considered to be part of conventional medicine.”²⁴ CAM therapies are commonly being used among the general U.S. population for the treatment of

musculoskeletal pain including: back pain, neck pain, joint pain or stiffness, and arthritis.^{26,27}

Other reasons the general population may turn to CAM therapies is due to a lack of belief in conventional medicine (28.0%) in addition to cost (13.0%).²⁶

There are many different types of CAM therapies including: 1) whole medical systems including homeopathic and naturopathic medicine; 2) mind-body medicine including meditation, prayer, mental healing, and yoga; 3) biologically based practices including dietary supplements and herbal products; 4) manipulative and body-based medicine including chiropractic care and massage and; 5) energy medicine including Reiki and therapeutic touch.²⁴

The seven most commonly used CAM therapies in 2007 included: Natural products, deep breathing exercises, meditation, chiropractic care, massage, yoga, and acupuncture.²⁷ According to the National Health Statistics Reports in the U.S. in 2007, CAM therapy use varied by region. The use of CAM therapies is highest in the Western Region of the U.S. (45.0%) and lowest in the Southern Region (33.0%). CAM use was more widespread among women (42.8%) vs. men (33.5%), ages 30-69, with advanced levels of education who are not underprivileged.²⁷

Since CAM use is more prevalent among women,²⁷ at least one study has looked at the different types of CAM therapies being used among the female population.²⁸ For example, in a national study of CAM use among women \geq 18 years of age living in the U.S, it was reported that 26.0% used vitamins and 18.0% medicinal herbs/teas. Women with back pain (73.5%) took vitamins and nutritional supplements at the same time as prescription or over-the-counter medications. Women used acupuncture (84.0%), chiropractic care (54.0%)

and homeopathy (52.0%) for health conditions such as musculoskeletal pain. Sixty-two percent most often used yoga, tai chi, and meditation to stay healthy.²⁸

Many studies have reported CAM therapies to be effective in reducing musculoskeletal pain among the general population. Yoga,^{11,12} acupuncture,^{13,14} and massage¹⁵ have been reported to significantly reduce chronic low back pain. Furthermore, massage has reported short term clinical benefits for the treatment of chronic neck pain.¹⁶

While CAM therapies have been long used for musculoskeletal pain, their effectiveness for managing pain has not been studied among dental hygienists. One study reported chiropractic care, massage therapy and acupuncture treatment use by dental hygienists, although this study did not report pain improvement. It was suggested that social environment and work organization be addressed to evaluate the ergonomics and other problems within the dental office setting.⁴ However, studies have shown CAM therapies to be effective in managing chronic musculoskeletal pain for the general population.¹⁰⁻¹⁶

Types of CAM Therapies Used to Relieve Chronic Musculoskeletal Pain

The most common use for CAM is treatment of musculoskeletal problems, including back and neck pain or stiffness and arthritis. The seven most commonly used CAM therapies in 2007 are described in detail below.²⁷

Natural Products

In 2007, the most commonly used CAM therapy was nonvitamin, nonmineral, natural products taken orally that include a dietary ingredient used to supplement the diet. Examples include but are not limited to: Fish oil/omega 3 fatty acids; glucosamine; echinacea; flaxseed; ginseng.²⁷

Deep Breathing Exercises

The 2nd most commonly used CAM therapy among adults in 2007 was deep breathing exercises. This involves slow, deep breaths through the nose, followed by a complete exhalation. This method involves inhaling for 10 seconds, then exhaling for 10 seconds. This is repeated for at least 5 cycles, multiple times throughout the day.²⁷

Meditation

The 3rd most commonly used CAM therapy is meditation. This is when an individual focuses his/her attention on breathing or an object, attempting to keep the mind clear and free from any other thoughts. When practiced regularly, meditation can cause physical relaxation and mental stillness. Practicing regularly can change the way a person relates thoughts and emotions,²⁷ as well as deal with different situations.

Chiropractic Care

The 4th most commonly used CAM therapy involves manipulation of the spine and joints. Chiropractors often use hands-on manipulation (or adjustment) as their primary procedure.²⁷ Chiropractors perform a routine clinical examination including a spinal evaluation when dealing with patients, and rarely report the use of interventions that are associated with other CAM providers such as acupuncture (6.0%) and nutritional supplements (6.0%).²⁹ For example in Arizona, 82.0% of the visits to a chiropractor included spinal adjustments and 10.0% of those visits included recommendations for specific exercises, compared to chiropractic visits in Massachusetts where 85% of the visits included spinal adjustments and 20.0% recommended specific exercises.²⁹

The general population in the U.S. with low back pain^{10,15,30} and general pain³¹ commonly seek chiropractic care, while 54.0% of women report the use chiropractic care for

a health condition.²⁸ In the same way, 85.0% of patients in Arizona and Massachusetts referred themselves to the chiropractor most commonly for back and neck pain, wellness care, and headaches.²⁹

Massage Therapy

The 5th most commonly used CAM therapy is massage. Massage therapists use hands-on techniques to manipulate muscle and connective tissue, which also promotes relaxation.²⁷ Massage is commonly used by individuals to treat musculoskeletal pain,^{26,31} including low back pain¹⁵ and chronic neck pain.¹⁶ For example, individuals with chronic neck pain reported they were “better” or “much better” at the 4 week follow-up visit, after receiving weekly massages for one hour per session, based on the global rating of improvement ($p=.003$) when compared to the 10 week ($p=.03$) and 26 week ($p=.14$) follow-up visits. This study concluded short term clinical benefits to using therapeutic massage for chronic neck pain.¹⁶

Yoga

The 6th most commonly used CAM therapy is yoga. Yoga emphasizes the unity of the body, mind, and spirit,³² combining physical exercise with relaxation techniques.¹² It is usually performed in classes, private sessions, and at home at least once a week for an average of 45 minutes.²⁷

Yoga is commonly used for musculoskeletal pain.²⁷ For example, a national telephone survey among adults in the U.S. found the most common health conditions treated with yoga were back and neck pain.³²

Studies have reported musculoskeletal pain improvement with regular yoga practice. For example, individuals reported significantly reduced chronic low back pain, functional disability and depression when taking Iyengar yoga classes twice a week for 24 weeks.¹¹

Consequently in a 12-week study among adults with chronic low back pain, patients in the yoga group had improved back-related functions than those in an exercise or education group.¹² Likewise, yoga practitioners had less muscle soreness 24-48 hours after strenuous exercise compared to those who did not practice yoga.³³

Acupuncture

The 7th most commonly used CAM therapy is acupuncture. Acupuncture involves penetrating the skin with thin, metallic needles at anatomical points on the body,²⁷ which regulates the energy flow throughout the body.³⁴ The use of acupuncture among the general U.S. population has increased from 1997-2007. This may be due to an increase in states that license acupuncturists and increased insurance coverage for acupuncture treatment.³⁵ In 2002, the National Health Interview Survey (NHIS) surveyed a national sample of adults regarding their use of acupuncture. Out of the top 10 conditions treated with acupuncture, 7 were musculoskeletal pain complaints.^{26,36} It has been reported that individuals use acupuncture most frequently for back pain, followed by joint pain, neck pain, headache, and recurring pain.^{26,36}

Acupuncture has shown to be effective for chronic low back pain.¹³ For example, a study including patients with chronic low back pain were randomized to receive acupuncture, minimal acupuncture, or waiting list control over 8 weeks. Results demonstrated that acupuncture was more effective in reducing and improving pain over a period of 8 weeks compared to having no acupuncture treatment.¹⁴ Researchers are currently looking at the biomechanics to determine how acupuncture works to relieve pain, as well as the effects on various regions of the brain.³⁴

CAM Use among Patients Who See a Primary Care Physician

Patients who use CAM therapies are likely to see a primary care physician as well. In fact 86.0% of CAM users have a primary care physician,³⁷ while 54.9% of individuals reported that CAM combined with conventional medicine would help them more than either therapy alone.²⁶ Other studies report individuals using a combination of both CAM and conventional therapies.^{25,38} Primary care patients report they currently use or have used CAM therapies in the past for chronic musculoskeletal pain (52.0%).³⁹ CAM therapies are being used most commonly for back, neck, or shoulder pain compared to other parts of the body.²⁵ Other reasons for using CAM include the following: to avoid side effects of conventional treatment and; failure of conventional treatment to cure the underlying problem.⁴⁰

Complementary and Alternative Medicine (CAM) Use According to Region

CAM use can vary depending on where an individual lives, as well as the availability of local providers and products.⁴¹ In the U.S., CAM use is reported most commonly to less frequently among individuals living in the West (44.6%), Midwest (41.4%), Northeast (38.0%), and South (32.5%).²⁷ For instance, 52% of primary care patients in rural West Texas reported they were currently using or had used CAM in the past.⁴² These patients reported seeing a chiropractor most frequently (43.0%), followed by massage therapist (33.0%), herbalist (8.0%),^{40,42} acupuncturist (7.0%), and naturopath (6.0%). Likewise, there is a high rate of CAM use among rural Appalachians in southwest Virginia. Faith healing and prayer were reported as the most commonly used CAM therapies among rural Appalachians, followed by family and community taught remedies.⁴³

Healthcare Spending on CAM and Conventional Medicine

Adults spent 33.9 billion dollars on out-of-pocket expenses to CAM practitioners, classes, products and materials in 2007.³⁵ 11.9 billion was spent on practitioner visits alone; 14.8 billion on nonvitamin, nonmineral, natural products; and 4.1 billion was spent on yoga, tai chi, qi gong. In 2002 and 2007 when individuals were unable to afford conventional care, they were more likely to use CAM therapies.²⁷ In the same way, individuals may be more likely to use CAM therapies if their health insurance covers a portion of the cost of treatment.^{28,37} For example, three quarters of women who used chiropractic care and almost half who used acupuncture received at least partial insurance coverage.²⁸ It has been reported that CAM use is high among those who have health insurance.^{28,37} However, those who have private health insurance are more likely to use CAM compared to those who have public health insurance.²⁷

Healthcare Professionals Attitudes Toward and Acceptance of CAM Therapies

Healthcare professionals have different views toward CAM therapies.³⁹ The purpose of a study conducted at a health center in Halifax, NS, Canada was to determine which barriers prevent health care professionals from effectively communicating with patients and families about CAM use, as well as their knowledge and attitudes. A majority of the respondents were nurses (72.0%), and a smaller portion was physicians (13.0%) and other health professionals (15.0%). Of the respondents, 80.0% rarely if ever used CAM and 86.0% never visited a CAM practitioner, 69.0% did not have a formal opportunity to learn about CAM, 96.0% supported massage use but were not as supportive of naturopathy or homeopathy. Fifty-nine percent were uncomfortable discussing CAM with their patients.

This study concluded that training and resources are needed for health professionals in order to provide appropriate information to their patients.⁴⁴

In a study conducted in Australia with pharmacy students to find out the attitudes, beliefs, and perceptions about CAM, 89.2% saw the need for CAM in patient care. They perceived barriers to incorporating CAM as lack of scientific evidence (86.5%), lack of trained professionals (65.8%), lack of government subsidies (48.6%), and legal issue concerns (27.0%).⁴⁵

Use of Surveys in Health Services Research

Surveys are used to collect information from or about people to describe, compare, or explain their knowledge, feelings, values, and behavior.⁴⁶ A survey can be self-administered (mailed, on-site, or online) or can be conducted by an interview (face-to-face or telephone). Each type of survey has advantages, disadvantages, particular needs, and costs. A reliable survey yields consistent information and a valid survey gives accurate information. A well-designed, easy-to-use survey always contributes to reliability and validity.⁴⁶

Self-administered questionnaires require much preparation and attention in order to yield a good response rate. Pilot testing can help improve the response rate by eliminating poor or confusing questions, which can also assist with reliability and validity. In order to help improve response rate, self-administered surveys should be kept short and include incentives.⁴⁶

A large body of literature exists on the wording and formatting of survey questions. Open-ended survey questions allow respondents to answer the question in their own words, which can offer valuable insight into people's beliefs. Their answers can expand beyond what the researcher might have selected for a closed-ended question; however, the diversity

of answers can make the results difficult to analyze. Closed-ended survey questions are more common and form the basis of most standardized measures.⁴⁷ Closed-ended questions allow the respondent to understand what type of answer the researcher is seeking. These questions can be dichotomous or in Likert scale format. In this instance, the responses are easier to analyze and are more reliable.⁴⁸

An important step in designing these questions is to define the objective. The objective defines the kind of information that is needed.⁴⁹ Questions that ask respondents about their knowledge and perceptions, or their attitudes and feelings, are attempting to measure their subjective state. The basic task of most questions in this category is to place answers on a single, well-defined continuum, generally from positive to negative.⁴⁹ A common format used is the “very satisfied, somewhat satisfied, satisfied, or not satisfied.” Another similar format used is the “completely agree, agree, disagree, and completely disagree.”⁴⁹ Agree/disagree formats are typically not easy for respondents. Four cognitive steps are involved: first, they must read the statement and understand its literal meaning; second, they must look deeper into the statement to discern the underlying dimension of interest to the researcher; third, they must place themselves on the dimension of interest; lastly, they must translate this judgment into the agree/disagree response options appropriately. Agree/disagree formats many times offer a middle category such as undecided or neutral. This category appeals to some respondents, but it probably does not hurt to make respondents commit to a response.⁵⁰

Response Rate of Paper vs. Electronic Questionnaires

The response rates of paper vs. electronic questionnaires vary. Information can be gathered rapidly, efficiently and more cost-effectively from a large population when using an

electronic survey.⁵¹ Advantages to using electronic questionnaires over those sent through U.S. mail include: provide respondents an easy way to provide data without a clinic visit and; can produce clean data since answers can be checked for missing values and; responses will be accepted after the errors are corrected.⁴⁷ Longer comments have also been reported more frequently with e-mail compared to regular mail responses.⁵²

Although e-mail responses are received quickly, the response rate is usually lower. For example in one study, the percentage of e-mail responses was 33.6% and regular mail was 52.7%.⁵² Likewise, a second study had an e-mail response rate of 35.0% vs. 69.0%.⁵¹ Another study administered a questionnaire on a website for a group of surgeons to have access to, while another group of surgeons were sent the exact questionnaire in a paper format. Both groups received 3 additional requests or copies to complete the survey. The response rate for the electronic questionnaire was 45.0% and regular mail was 58.0%.⁵³ Though many studies have reported lower response rates for electronic surveys vs. mailed surveys, sending pre- and post-notification postcards to respondents participating in an electronic survey can increase the response rate.⁵⁴

Conclusions

Many dental professionals develop musculoskeletal disorders during their career. CAM therapies have been shown to be effective in the management of chronic musculoskeletal pain among the general U.S population. CAM therapies may help prevent and manage chronic musculoskeletal pain among dental hygienists wishing to improve their health and prolong their careers. Dental hygienists' acceptance and utilization of CAM therapies and their effectiveness are not known. Before their use can be advocated, we must learn about the: 1) experiences of dental hygienists who use CAM therapies to manage their

chronic musculoskeletal pain; 2) whether the use of CAM helps reduce lost work hours and; 3) whether CAM use improves career satisfaction and longevity. The purpose of this study was to determine if CAM use among dental hygienists with reported chronic musculoskeletal pain is associated with career satisfaction and longevity.

MANUSCRIPT

INTRODUCTION AND REVIEW OF THE LITERATURE

Physical stress is one of the leading etiologic factors in musculoskeletal disorders such as back pain, shoulder or neck tension, eyestrain, headaches¹ or carpal tunnel syndrome.^{1,2} In the same way, musculoskeletal disorders are an occupational risk for dental hygienists.³ Ninety-three percent² of dental hygienists recognize that their work causes and aggravates musculoskeletal pain.^{4,5} Dental hygienists have reported that “it’s an extremely physical job” and “it’s hard on one’s body.”⁴ For example, 69.5% of dental hygienists have reported musculoskeletal pain in the wrist/hand region, 68.5% in the neck region, and 67.4% in the upper back.²

There are many factors that contribute to musculoskeletal disorders in dental hygienists including repetitive motion, pinch-grasp, vibration, force, and awkward positions.^{2,5,6} Other factors leading to musculoskeletal disorders include: sitting for a long period of time, operator position, poor posture, lack of flexibility and strength, poor ergonomics, and insufficient work breaks.^{2,3,6,7}

Musculoskeletal disorders may interfere with the tasks involved in performing dental hygiene services. Many dental hygienists continue to work in pain due to financial constraints and as a result, many must decrease the number of days that they work.⁴ Dental hygienists have reported work stress and burn-out caused by the following contributing factors: musculoskeletal disorders, long working hours, and working without an assistant.⁸ Some have even chosen to leave the profession because of their musculoskeletal pain.^{4,9}

Chronic musculoskeletal pain is a problem among the dental hygiene population. Many studies have reported Complementary and Alternative Medicine (CAM) therapies, including yoga, massage, and acupuncture, to be effective in managing chronic musculoskeletal pain for the general population¹⁰⁻¹⁶ Therefore, the purpose of this study was to determine if dental hygienists are using CAM therapies to manage their chronic musculoskeletal pain and also, to determine if CAM therapies is associated with their career satisfaction and longevity.

Work Disruptions

Musculoskeletal disorders cause work disruptions among dental hygienists,^{4,20,21} and most recognize that work causes or aggravates musculoskeletal symptoms.⁴ Physical discomfort has been reported to occur more frequently after 10 years of clinical practice when compared to 5 years.⁴ It has been reported that dental hygienists with musculoskeletal disorders worked more clinical hours and treated more patients per day compared to those who did not experience pain symptoms.²¹ Time pressures and lack of breaks have been reported to have a physical impact on dental hygienists, who often lack control in the schedule.⁴

As a result of musculoskeletal discomfort, 31.0% of dental hygienists reported they work less now compared to in the past,⁴ with hand and neck pain causing a reduction in the number of work hours.²⁰ In another study, musculoskeletal discomfort caused 14.6% of dental hygienists to miss work, most frequently for lower back (7.0%) and hand (7.0%) discomfort.²⁰ As a consequence of musculoskeletal discomfort, the median number of sick days taken among dental hygienists was higher compared to those who did not experience pain (5 days vs. 2 days).²¹

Job Satisfaction and Career Longevity among Dental Hygienists

In 2007, dental hygienists in the United States reported high job satisfaction, with 53.8% being very satisfied and 32.2% being somewhat satisfied in their current place of employment.²² For example, dental hygienists were most commonly satisfied with patient interactions (94.5%) and overall work hours (90.6%), and least satisfied with benefits (55.8%), number of work breaks (30.3%), and management skills of the dentist (26.0%).²⁰ There are currently no reports that link musculoskeletal pain and career satisfaction among dental hygienists.

Job satisfaction may have an impact on career longevity for dental hygienists. It has been reported that changes in the work environment may increase the career longevity of dental hygienists.²³ Other factors reported to influence career longevity for dental hygienists include the following: professional membership in the ADHA, building relationships with patients, taking CE courses on advanced topics in dental hygiene, and participating in activities outside of the office.⁴ While dental hygienists in Texas are “primarily influenced by salary, followed by family responsibility, having a variety of duties, participation in decisions, professional collaboration, benefits, and a safe work environment.”²³

Strategies for Prevention of Chronic Pain for RDHs

Many dental hygienists report that their dental hygiene training did not prepare them for the physical demands that they faced when working full-time.⁴ Forty-nine percent of dental hygienists reported they had ergonomic training during their formal education compared to 21.0% of dental hygienists who reported having no ergonomic training.²⁰ Dental hygienists have reported that changing the social and physical work environment may help to improve musculoskeletal symptoms.⁴

Ergonomic training can reduce work related musculoskeletal disorders for dental hygienists.^{5,18} Proper ergonomics can improve neck postures by improving equipment, proper patient positioning, stretching, and technique training.¹⁹ In studies by Valachi and colleagues, prevention strategies of musculoskeletal disorders among dental auxiliaries include proper use of ergonomic equipment, frequent stretch breaks, maintaining lower back curve to reduce low back pain, using magnification loupes, adjusting operator chair properly, avoiding static postures, core strengthening with twenty minutes of aerobic exercise, and receiving education on musculoskeletal health and injury prevention.^{3,7}

Conventional Therapies for Treatment of Chronic Pain For RDHs

Dental hygienists may choose conventional therapies to help manage their chronic musculoskeletal pain. Conventional medicine is practiced by a medical doctor (MD) or doctor of osteopathy (DO), and allied health professionals such as nurses or physical therapists.²⁴ The general population with chronic pain reported seeing their general practitioner (67.2%), hospital specialist (34.0%) and physical therapist (25.9%) for treatment. These individuals reported taking prescription medications (58.4%) and non-prescription medications (57.4%) as the severity of their pain increased.²⁵ Dental hygienists reported using medications (NSAID's) and splints at night to help manage their chronic pain,⁴ although this study did not report its effectiveness. There are currently no reports of conventional therapy use as effective treatments for chronic pain among dental hygienists.

Use of Complementary and Alternative Medicine (CAM) Therapies for Chronic Musculoskeletal Pain

CAM therapies are defined as “a group of diverse health care systems and practices that are not considered to be part of conventional medicine.”²⁴ CAM therapies are commonly being used among the general U.S. population for the treatment of musculoskeletal pain including: back pain, neck pain, joint pain or stiffness, and arthritis.^{26,27} Other reasons the general population may turn to CAM therapies is due to a lack of belief in conventional medicine (28.0%) in addition to cost (13.0%).²⁶

There are many different types of CAM therapies including: 1) whole medical systems including homeopathic and naturopathic medicine; 2) mind-body medicine including meditation, prayer, and mental healing; 3) biologically based practices including dietary supplements and herbal products; 4) manipulative and body-based medicine including chiropractic care and massage and; 5) energy medicine including Reiki and therapeutic touch.²⁴

The six most commonly used CAM therapies in 2007 included: Natural products, deep breathing exercises, meditation, chiropractic care, massage and yoga.²⁷ According to the National Health Statistics Reports in the U.S. in 2007, CAM therapy use varied by region. The use of CAM therapies is highest in the Western Region of the U.S. (45.0%) and lowest in the Southern Region (33.0%). CAM use was more widespread among women (42.8%) vs. men (33.5%), ages 30-69, with advanced levels of education who are not underprivileged.²⁷

Since CAM use is more prevalent among women,²⁷ at least one study has looked at the different types of CAM therapies being used among the female population.²⁸ For example, in a national study of CAM use among women ≥ 18 years of age living in the U.S.,

it was reported that 26.0% used vitamins and 18.0% medicinal herbs/teas. Women with back pain (73.5%) took vitamins and nutritional supplements at the same time as prescription or over-the-counter medications. Women used acupuncture (84.0%), chiropractic care (54.0%) and homeopathy (52.0%) for health conditions such as musculoskeletal pain. Sixty-two percent most often used yoga, tai chi, and meditation to stay healthy.²⁸

Many studies have reported CAM therapies to be effective in managing musculoskeletal pain among the general population. Yoga,^{11,12} acupuncture,^{13,14} and massage¹⁵ have reported significant reductions in chronic low back pain. Furthermore, massage has reported short term clinical benefits for the treatment of chronic neck pain.¹⁶

While CAM therapies have been long used for musculoskeletal pain, their effectiveness of managing pain not been studied among dental hygienists. Studies have shown CAM therapies to be effective in managing chronic musculoskeletal pain for the general population.¹⁰⁻¹⁶ One study reported chiropractic care, massage therapy and acupuncture treatment use by dental hygienists, although this study did not report pain improvement. It was suggested that social environment and work organization be addressed to evaluate the ergonomics and other problems within the dental office setting.⁴

Conclusions

Many dental professionals develop musculoskeletal disorders during their career, while CAM therapies have been shown to reduce chronic musculoskeletal pain among the general population.¹⁰⁻¹⁶ Dental hygienists' acceptance, utilization, and effectiveness of CAM therapies are not known. We conducted a survey to learn about the: 1) experiences of dental hygienists who use CAM therapies to manage their chronic musculoskeletal pain; 2) whether CAM helps reduce work disruptions; 3) and whether CAM improves career satisfaction and

longevity. Therefore, the purpose of this study was to determine if CAM use among dental hygienists with reported chronic musculoskeletal pain is associated with career satisfaction and longevity.

STUDY DESIGN AND METHODS

This cross-sectional study used a survey design and was approved by the University of North Carolina Biomedical Institutional Review Board. Registered dental hygienists in California and North Carolina who are current members of the American Dental Hygienists' Association (ADHA) were recruited to complete an 18-item questionnaire entitled, "Does Use of Complementary and Alternative Medicine (CAM) Therapy for Management of Chronic Musculoskeletal Pain Improve Dental Hygienists' Career Satisfaction?" The questionnaire was administered between July 17 and August 31, 2009.

Development of Questionnaire

The questionnaire was developed based on a review of the current literature using a standard survey design. The questionnaire was critically reviewed for readability and comprehension by colleagues at the University of North Carolina (UNC).

A pilot study was conducted among registered dental hygienists in North Carolina and California attending continuing education courses in each state. Following these pilot tests, further modifications to the questionnaire were made which included: changes to how a question was asked; the addition/removal of questions and; the configuration of the questionnaire from paper into Qualtrics© software. The final questionnaire was approved by the IRB on June 18, 2009.

Administration of Questionnaire

Research Subjects

Dental hygienists who are current members of the American Dental Hygienists' Association were recruited from California and North Carolina. These two states were chosen since the use of CAM therapy has been reported to be highest in the Western region (44.6%) of the U.S. and lowest in the Southern region (32.5%).²⁷ It was anticipated that the subjects in California would report greater use of CAM therapies since more adults in the West use CAM therapies when compared to adults in the South,²⁷ thus assuring this study an adequate number of respondents with experience in the primary outcome measured.

Inclusion/ Exclusion Criteria

This study included all registered dental hygienists who are members of the North Carolina Dental Hygienists' Association and California Dental Hygienists' Association with e-mail addresses (N=2431). Dental hygienists who participated in the pilot study, dental hygiene students, members of the general public, dentists, dental assistants or others who are not registered dental hygienists were excluded.

Contents of Questionnaire

The questionnaire consisted of five Domains:

1. Personal Experience with Chronic Pain and Pain Management
2. Use of Conventional Therapies
3. Use of CAM Therapies
4. Opinions about CAM Therapies
5. Respondent Demographics

On-Line Questionnaire

The final version of the questionnaire was formatted using Qualtrics© for electronic distribution. One week before sending the link to the survey, subjects were invited to complete the web-based survey on an individual basis in order to prevent e-mails from being identified as spam. One week later, individuals were sent a second e-mail that directed them to a website to complete the questionnaire. As individuals responded, Qualtrics© logged-in respondents so that reminder e-mails were sent only to non-respondents. Also, this prevented participants from responding more than once. A first reminder e-mail was sent 10 days after the first mailing, with the addition of a second reminder 2 weeks later. A final e-mail reminder was sent one week before closing the study on August 31, 2009.

Data Capture and Analysis

Data were transferred to an Excel spreadsheet and stored in a local, secure computer for data analysis and management. Statistical analyses were conducted using SAS 9.2. Univariate and bivariate analyses were performed to determine the following: demographic information; most frequently reported locations of pain; how many respondents used CAM or conventional therapies; types of CAM or conventional therapies most frequently used and; career disruption from chronic musculoskeletal pain between the two states.

Career satisfaction was assessed using dependent samples t-test. Dependent samples t-test was also used to determine career longevity between respondents who used CAM or conventional therapies. Independent samples t-test was used to determine the opinions about CAM and conventional therapies for chronic musculoskeletal pain management. Chi-square analysis was used for the following: to investigate the relationship between having chronic musculoskeletal pain and using CAM therapies and; to compare the use of CAM therapies

between dental hygienists in California and North Carolina. To control for multiple comparisons, we used a Bonferroni correction when investigating the opinions of dental hygienists toward CAM therapies.

Age, education, year degree was earned, and number of years working as a registered dental hygienist were used in the logistic regression analyses. Logistic regressions were performed for the following: to assess the relationship between having pain in relation to respondents' acceptance and opinions about CAM use for chronic musculoskeletal pain management; to investigate the relationships between the type of therapy used and the effect of pain on work status and career satisfaction; to predict CAM use by individuals' age, health status, gender, race, type of degree and number of years practicing; to predict whether or not ergonomics was reinforced in the clinic based on pain, age, education, and number of years practicing.

RESULTS

A total of 2431 surveys were sent electronically with a response rate of 25.3% (N=617). Each state had equivalent percentages of respondents (CA=25.2%, NC=25.1%).

Demographics: Our findings showed that a majority of the dental hygiene population was female (97.7%), non-Hispanic (87.2%), and work primarily in general dental offices (72.3%). A total of 76.5% (n=472) of respondents reported having chronic musculoskeletal pain. The mean duration of pain was 6.1 years (median= 3.5). Other demographic characteristics of respondents are found in Table 1.

Reported Location of Pain

Figure 1 shows the most frequently reported locations of pain among dental hygienists.

CAM Use vs. Conventional Therapy and Effect on Work Schedule: Figure 2 shows career disruption among dental hygienists as a result of chronic musculoskeletal pain. About one quarter of respondents (23.5%) who reported chronic pain either called in sick or missed work as a result of their pain. After accounting for conventional therapy users, individuals who used CAM therapies alone, when compared to individuals who used both CAM and conventional therapies, had 5x lower odds of temporarily quitting work for longer than 1 month (OR=4.9, 95% CI=1.2 to 20.9).

CAM Use to Manage Chronic Musculoskeletal Pain: Figure 3 shows reported CAM use among dental hygienists. Respondents most frequently reported using both CAM and conventional therapies to manage work-related chronic musculoskeletal pain (80.7%, n=381).

Of the 472 individuals who reported work-related pain, 14.2% (n=67) used CAM therapies alone, 3.6% (n=17) used conventional therapies alone, and 1.5% (n=7) did not use any therapies.

Opinions About CAM for Chronic Musculoskeletal Pain: Dental hygienists' musculoskeletal pain symptoms improved significantly when using CAM therapies vs. conventional therapies ($t(367)=3.19, p=.002$). Table 2 shows dental hygienists who reported pain vs. no pain had significantly higher levels of agreement with the statements displayed in the table. When dental hygienists who reported work-related pain were asked for their opinions about using CAM for chronic musculoskeletal pain management, these individuals were 3 times more likely to agree that CAM therapies were acceptable for chronic musculoskeletal pain management (OR=3.1, 95% CI=2.1 to 4.5) and were 2 times more likely to use CAM therapies for chronic musculoskeletal pain management (OR=2.3, 95% CI=1.6 to 3.3) when controlling for age, education, year the degree was earned, and years practicing as a dental hygienist.

CAM Use for Chronic Musculoskeletal Pain and Reported Career Satisfaction: Table 3 shows respondents' agreements about CAM therapies and conventional therapies in relation to their effect on career variables. Individuals who used CAM therapies alone had significantly higher odds of agreeing they were satisfied with their career as a dental hygienist when compared to users of conventional therapies (OR=2.0, 95% CI=1.0 to 4.0).

CAM Use among Dental Hygienists in California vs. North Carolina: There were no statistically significant differences in use of CAM therapies between respondents in CA [n=285 (61.0%)] and NC [n=86 (59.7%)] $p=.78$. Therefore, our results for CAM use are expressed as the total sample of registered dental hygienists and is homogeneous regardless

of state with the exception of two variables: NC dental hygienists were more likely to leave clinical practice due to chronic musculoskeletal pain vs. dental hygienists in California ($\chi^2=11.0, p<.001$) and; NC dental hygienists were more likely to report compromising patient comfort due to chronic musculoskeletal pain than CA dental hygienists ($\chi^2=6.3, p=.012$).

Effects of Age, Self-Reported Health Status, Gender, Race, Type of Degree, and Number of Years Practicing on the Use of CAM to Manage Chronic Musculoskeletal

Pain: We looked at the reported use of CAM therapies and found: older individuals were more likely to use CAM when compared to younger individuals (OR=1.03, 95% CI=1.001 to 1.055) and; CAM users were more likely to report poorer health status when compared to non-CAM users (OR=1.8, 95% CI=1.3 to 2.4). There were no statistically significant differences when controlling for gender, race, type of degree earned, and number of years practicing.

Education/Ergonomics: We asked respondents if they received classroom lectures on ergonomics, and we found that 30.6% strongly agreed that their dental hygiene training included classroom lectures on ergonomics. We also looked at whether respondents recalled that the principles of ergonomics were reinforced in the clinic, and we found that individuals who did not report pain were more likely to recall that ergonomics were reinforced in the clinic (OR=0.64, 95% CI=0.45 to 0.92). Older individuals and individuals who had been practicing longer were less likely to recall that ergonomics were reinforced in the clinic (OR=0.97, 95% CI=0.95 to 0.99) when controlling for pain, age, number of years practicing, and education.

DISCUSSION

Reported CAM Therapies

Musculoskeletal pain is associated with work stress and burn out among dental hygienists³ however, no studies have examined the use of CAM for chronic musculoskeletal pain in this population. Dental hygienists recognize that their work causes and aggravates musculoskeletal pain,^{2,4,5} and some have sought relief through the use of CAM therapies.

Figure 2 reports the six most commonly used CAM therapies by participants in this study. In comparison to the NHIS report in the U.S. which surveyed the general public, dental hygienists are more likely to utilize CAM therapies.²⁷ Although CAM use varies between dental hygienists and the general population, the types of CAM therapies used are very similar. The following 6 CAM therapies are commonly being used by the general public: 1) nonvitamin, nonmineral, natural products (17.7%); 2) deep breathing exercises (12.7%); 3) meditation (9.4%); 4) chiropractic care (8.6%); 5) massage (8.3%) and; 6) yoga (6.1%).²⁷ One possible reason for the variation in CAM use between the two groups may be due to a difference in income. The majority of the general population who use CAM therapies are not poor, meaning they have family incomes that are 200% of the poverty threshold or greater, according to the U.S. Census Bureau.²⁷ Dental hygienists have a mean annual income ranging from \$35,483 (≤ 30 hours/week) to \$55,810 (≥ 31 hours/week)²² therefore, they may be more likely to use cost-intensive therapies, such as massage and chiropractic care, compared to the general population.

Difference in CAM Therapy Use According to Age and Region

The findings of this study demonstrated that the use of CAM therapies among dental hygienists was similar to the general U.S. population in regards to gender (women) and age (30-69).²⁷ Unlike the 2007 NHIS survey which reported a difference in CAM use between individuals in the Western Region of the U.S. (45.0%) compared to those in the Southern Region (33.0%),²⁷ our study showed no statistically significant difference in CAM use between respondents in California and North Carolina. Again, one reason for this difference may be due to a variation of income rather than geographic reasons.

Impact of Musculoskeletal Disorders

In this study, 23.5% of dental hygienists called in sick or missed work due to chronic musculoskeletal pain. This finding is greater than a previous study that found musculoskeletal discomfort to cause only 14.6% of dental hygienists to miss work.²⁰ Our findings also demonstrated that dental hygienists who used CAM therapies alone had lower odds of quitting work for longer than 1 month. Therefore, dental hygienists who use CAM therapies may lessen the likelihood of calling in sick or missing work.

Opinions about CAM Therapies

In this study when dental hygienists were asked their opinions about CAM therapies, they reported that CAM therapies are acceptable and they would use CAM therapies for chronic musculoskeletal pain management. Likewise, previous research has found that most CAM users seek treatment for chronic musculoskeletal pain.^{13,15,16,25-30,36,38,39,55} Therefore, our sample is similar to the general population who use CAM therapies for chronic musculoskeletal pain management. Likewise, dental hygienists may find CAM therapies to be acceptable due to the ability to manage their chronic musculoskeletal pain.

CAM and Conventional Therapy Use

In this study, 80.7% of dental hygienists used both CAM and conventional therapies for the treatment of chronic musculoskeletal pain. This finding is similar to a study that reported 69.0% of individuals who used CAM plus conventional therapies.³⁸ In the same way, another study reported that 67.0% of patients who saw an alternative practitioner for pain saw a conventional practitioner as well.^{25,37} In addition, 52.0% of primary care patients reported current or prior use of CAM therapies for pain management.³⁹ Similar to the general population, RDHs prefer to use both CAM and conventional therapies in a complementary fashion.

Career Satisfaction

Dental hygienists have reported high career satisfaction (53.8%), even though some aspects of the job are dissatisfying.²² This study reports similar findings in that respondents who did not have pain reported significantly higher career satisfaction when compared to those who reported pain ($p=.001$). CAM users reported significantly higher odds of agreeing they were satisfied with their career compared to conventional therapy users. Based on our findings, dental hygienists who use CAM therapies might experience less musculoskeletal pain, leading to higher career satisfaction.

Strengths and Limitations

Strengths of this study include: 1) ADHA members who were surveyed represent the general population of dental hygienists;²² 2) dental hygienists and the general population have a similar preference for the types of CAM therapies that they use;²⁷ 3) dental hygienists are using both CAM and conventional therapies for their musculoskeletal pain, which is consistent with the general population.^{25,37,39,56}

There were several limitations to our study, including a low response rate. Reasons for this may include: due to the time of year the survey was sent, a majority of individuals may have been on summer vacation; inaccurate e-mail addresses; questionnaire may have been too long; the title of the questionnaire may have influenced individuals without pain not to participate; using an electronic questionnaire vs. paper since studies have shown a higher response rate with paper questionnaires.⁵¹⁻⁵³ Therefore, we speculate that a higher response rate may have been obtained with a paper questionnaire, administered at a different time of year, and with a more neutral title.

We did not take into account CAM use between rural and urban settings. For example, one study reports that CAM use is high among rural Appalachians,⁴³ and dental hygienists in rural Appalachian North Carolina may have accounted for a greater use of CAM therapies than expected. Therefore, if we had taken rural and urban settings into account among our sample, we may have seen a difference in CAM use between states.

We also did not ask our respondents which types of herbal/nutritional supplements they have taken for chronic musculoskeletal pain. The general population in the U.S. report taking fish oil/omega 3 or glucosamine most frequently.²⁷ Therefore, having the respondent's list specific supplements taken may have given us more information to compare to the general population in the U.S.

Biases to our study include Sampling bias: we surveyed ADHA members only, and the general dental hygiene population may have different opinions about chronic musculoskeletal pain and CAM use; Geographical bias: we surveyed dental hygienists in California and North Carolina only, whereas a national sample across 50 states may have different opinions. Therefore, a national sample of non-member as well as member dental

hygienists may have different opinions about CAM use for chronic musculoskeletal pain management.

New Discoveries and Impact on Dental Hygiene Profession

In this study, dental hygienists with work-related pain who used CAM therapies reported they had greater overall health, career satisfaction, were able to work the hours they wanted, and felt more secure and happy in their jobs vs. conventional therapy users.

Therefore, dental hygienists who use CAM therapies to manage their work-related pain may have increased career satisfaction as well as career longevity.

Our respondents expressed the opinion that CAM should be covered by insurance. Therefore, if more insurance companies cover the cost of CAM therapies, then dental hygienists may be more likely to use CAM therapies to manage and even prevent musculoskeletal pain.

Also, CAM practitioners may be in need of information relating to the work-related pain issues of their dental hygiene clients. Therefore, providing the results of this study will be helpful to CAM practitioners when treating dental hygienists. Future research should consider dental hygienists needs and the types of CAM therapies they will benefit from the most to manage their musculoskeletal pain.

Education/Ergonomics

While the use of CAM therapies may help dental hygienists to manage their pain and increase their career satisfaction, we should look at ways to prevent musculoskeletal pain from occurring. It has been suggested that improvements in the work environment may help reduce the risk of developing musculoskeletal disorders.^{2,5,9,18,19,57} For that reason,

improving the work environment may be a contributing factor to reducing musculoskeletal disorders and work disruptions for dental hygienists.

At the same time, it has been suggested that ergonomic education be incorporated into the dental hygiene curriculum.^{2,5,18,57,58} In our study, respondents who did not report pain recalled that ergonomics was reinforced in the clinic during their training. Therefore, incorporating ergonomics into the curriculum and reinforcing it in the clinic, as well as the continued use of proper ergonomics after graduation in addition to continuing education courses, may prevent or reduce musculoskeletal pain among dental hygienists.

CONCLUSIONS

Our study reports that using CAM therapies for chronic musculoskeletal pain is associated with greater overall health and career satisfaction among RDHs. In addition, CAM practitioners may benefit from information on work-related pain issues for their RDH clients. Future research should increase student awareness of chronic musculoskeletal pain risk, enhance ergonomics education, and incorporate CAM, such as yoga stretches, into the classroom and clinic routine.

Table 1: Characteristics of Respondents			
Variable		Total	
		N	%
Age N=620	21-30	95	15.3
	31-45	171	27.6
	46-55	180	29.0
	≥ 56	167	26.9
Race N=620	White	499	80.5
	Nonwhite	96	15.5
Ethnicity N=620	Hispanic	25	4.0
	Non-Hispanic	541	87.2
Gender N=620	Female	603	97.7
	Male	14	2.3
Education N=620	Associate or Certificate	357	57.9
	Bachelor's	209	33.9
	Beyond Bachelor's	51	8.3
Year Degree Earned N=620	Before 1975	86	13.9
	1975-1999	291	46.9
	2000-2008	223	36.0
Years Employed as RDH N=620	<1	18	2.9
	1-5	137	22.1
	6-10	60	9.7
	11-20	112	18.1
	> 20	273	44.1
Practice Type N=620	General	444	72.3
	Other	170	27.7
General Health N=620	Excellent/Good	600	96.8
	Fair/Poor	17	2.7

*Missing values are not included in this table

Table 2: Opinions about CAM Therapies for Chronic Musculoskeletal Pain Management between Respondents who Reported Pain vs. No Pain

Opinions about CAM Therapies	Difference in Opinion**	SD	<i>t(df)</i>
I would use CAM for chronic pain management	.33	.74	4.71(609)*
I would recommend CAM to a friend/family member	.41	.78	5.51(605)*
CAM therapies are acceptable for chronic pain management	.48	.75	6.67(606)*
I would use CAM in addition to conventional medicine for pain	.20	.75	2.76(609)
I would use CAM as an alternative to conventional medicine	.34	1.03	3.51(610)*
CAM should be covered by medical insurance	.32	.71	4.75(610)*

*Indicates $p < 0.005$

** Respondents from both groups were averaged and the difference between means was compared. A Likert scale was used ranging from 1=strongly agree and 5=strongly disagree. Note: The mean difference is between respondents who reported pain compared to no pain. Values indicate stronger agreement about use of CAM therapies for those who reported pain.

Table 3: Association between CAM and Conventional Therapy Use on Career Variables

Career Variables	CAM vs. Conventional Mean Difference**	<i>t(df)</i>
Contributed to my overall career satisfaction	.49	8.31(365)*
Contributed to my career longevity	.52	7.75(366)*
Contributed to my overall health and well-being	.64	9.62(368)*
Helped me work the hours I want	.28	4.71(367)*
Helped me feel more secure and happy in my job	.47	7.72(366)*

*Indicates $p < 0.001$

** Respondents from both groups were averaged and the difference between means was compared. A Likert scale was used ranging from 1=strongly agree and 5=strongly disagree. Note: The mean difference is between respondents who used CAM therapies compared to conventional therapies. Values indicate stronger agreement for those who used CAM therapies vs. conventional therapies.

Figure 1

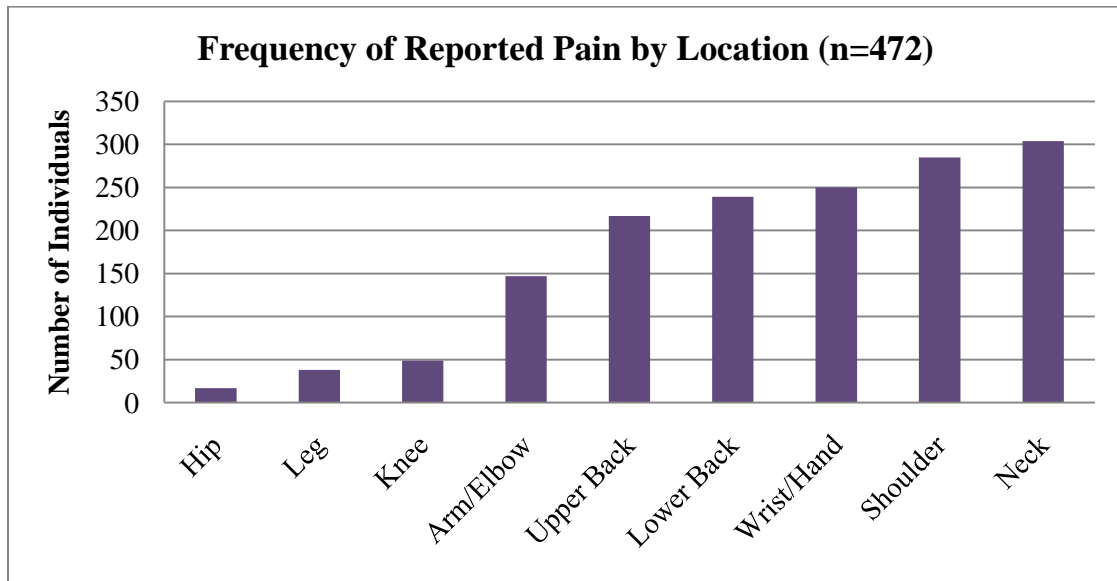


Figure 2

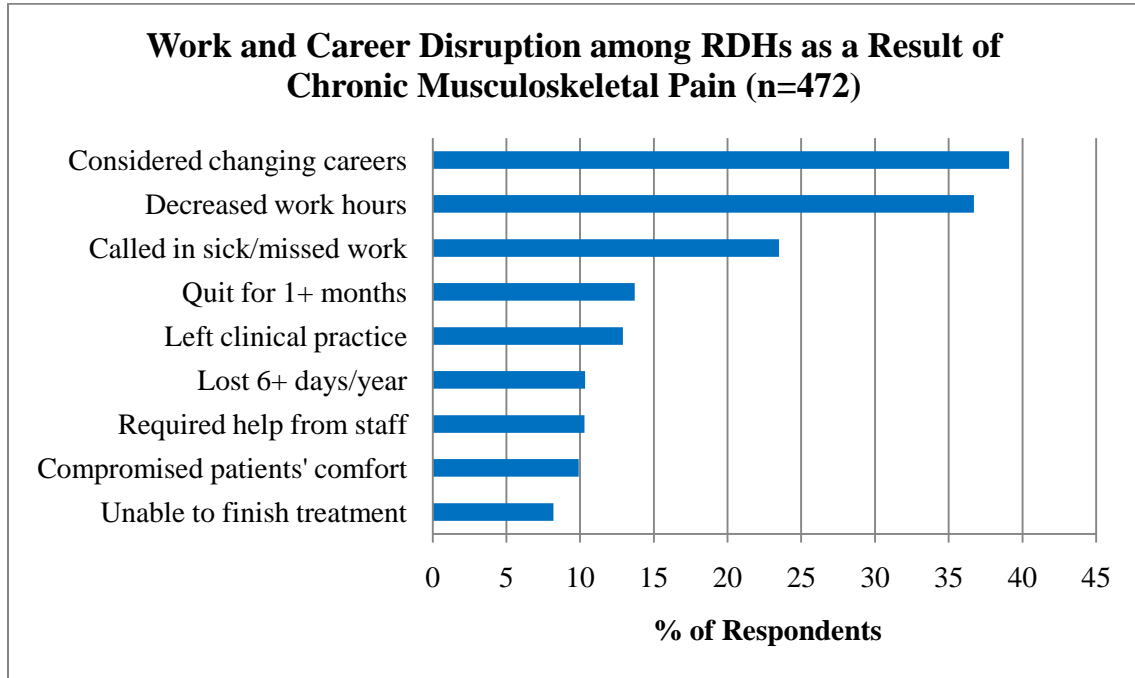
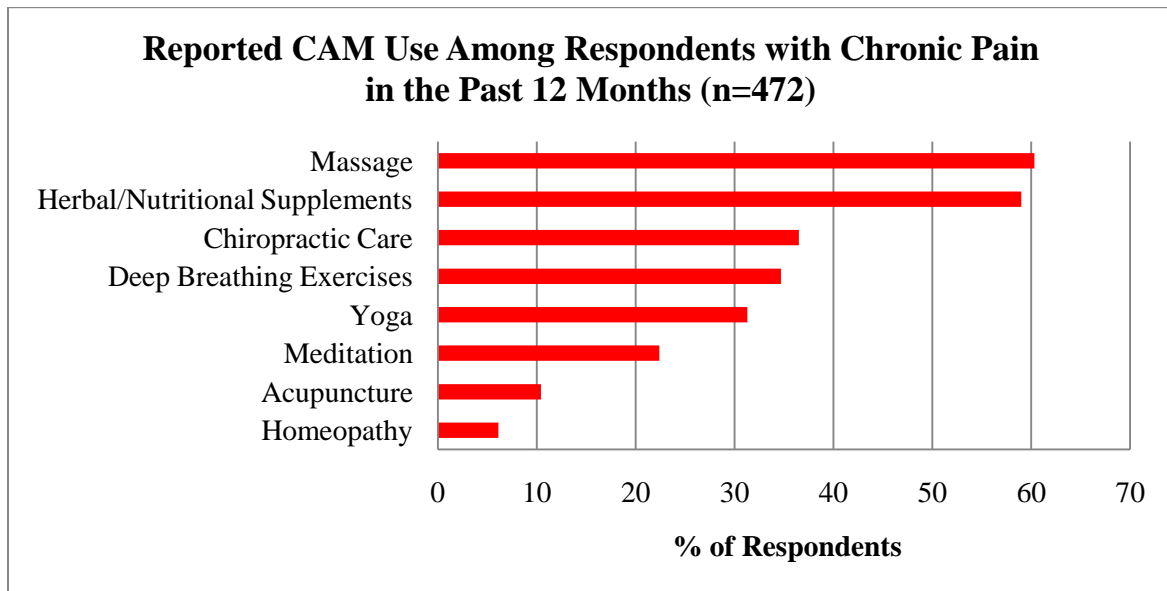


Figure 3



APPENDIX

Default Question Block

Does use of Complementary and Alternative Medicine (CAM) Therapy for Management of Chronic Musculoskeletal Pain Improve Dental Hygienists' Career Satisfaction?
We are interested in your opinion!

- Researchers at The University of North Carolina School of Dentistry are conducting this survey.
- Your participation in this survey will help to advance Dental Hygiene research and education.
- The questions you are about to answer are related to musculoskeletal pain.
- You do not need to be experiencing pain to complete the survey.
- There are 5 sections to this survey; you may not be required to complete all of the sections depending on how you answer the questions:

We appreciate your time and effort to further dental hygiene research and education!

Please indicate your consent to participate in this survey below.

- I give my consent to participate in this survey
- I do not give my consent to participate in this survey

Did you complete a similar questionnaire at either of the dental hygiene continuing education courses held at:

- The University of North Carolina in Chapel Hill on April 24, 2009
- Anaheim, California on May 15, 2009

- Yes
- No

Section 1

The following questions will use the term Chronic Musculoskeletal Pain.
If you are not familiar with this term, the definition is listed below.
You do not need to be experiencing pain to complete the survey.

Chronic musculoskeletal pain is defined as pain in the muscles or bones that persists or progresses over a prolonged period of time, about 3 months or more.

Have you ever experienced chronic musculoskeletal pain in one or more of the following body parts that has caused discomfort in your routine dental hygiene work? (Select **ALL** that apply)

Arm

- Knee
- Leg
- Lower back
- Neck
- Shoulder
- Upper back
- Wrist/hand
- Other (Please Specify)
- NO, I have never experienced chronic musculoskeletal pain

How long have you had or did you have this chronic musculoskeletal pain? (Please least years and months in the boxes below)

Years

Months

Is this pain still ongoing?

- Yes
- No

As a result of your chronic musculoskeletal pain, have you ever:

	Yes	No	Don't Recall	Decline to Answer
a. Called in sick or missed work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Lost more than 6 days of work per year?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Decreased work hours?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Required assistance from your co-workers to complete your daily tasks?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Compromised your patients' comfort during their appointment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Been unable to complete scheduled treatment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Temporarily quit working as a dental hygienist for longer than 1 month?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Considered changing careers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I. Left clinical practice?

Section 2

The following questions will include the term **Conventional Medical Therapy**.
If you are unfamiliar with this term, the definition is listed below.

Conventional Medical Therapy for chronic musculoskeletal pain management is defined as traditional treatments that are commonly delivered by physicians, physical therapists, registered nurses and nurse practitioners, **EXCLUDING chiropractic care**.

Which of the following **conventional** pain management therapies, **EXCLUDING chiropractic care**, have you used to help manage your chronic musculoskeletal pain? (Select **ALL** that apply)

- Injections
- Non-Prescription Drugs
- Physical Therapy
- Prescription Drugs
- Splint
- Surgery
- Other (Please specify)
- None

While using one or more of these **conventional** medical therapies, your pain symptoms have:

	Gotter Worse	Stayed the Same	Improved Somewhat	Improved Significantly	Improved Completely
Please select 1 answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For how long have you used **conventional** therapy for your chronic musculoskeletal pain? (please list **years and months** in the boxes below)

Years

Months

Please indicate your level of agreement with the following statements.

Using **conventional** medical therapy for management of my chronic musculoskeletal pain has:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. Contributed to my overall career satisfaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Contributed to my career longevity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Contributed to my overall health and well-being.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Helped me work the hours I want to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Helped me feel more secure and happy in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 3

The following questions will include the term Complementary and Alternative Medicine (CAM). If you are unfamiliar with this term, the definition is listed below.

Alternative Therapy is defined as non-conventional therapy used in place of (instead of) conventional or more traditional therapy or treatment.

Complementary Therapy is defined as non-conventional therapy used in addition to treatments prescribed by your doctor.

Complementary and Alternative Medicine (CAM) is defined as either or both.

What is your experience with the following Complementary and Alternative Medicine (CAM) therapies for chronic musculoskeletal pain management?

	Used in the past 12 months	Used in past	Heard of it but never used it
Herbal Supplements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nutritional Supplements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deep Breathing Exercises	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chiropractic Care (spinal manipulation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Massage Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Yoga	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Homeopathy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have you used any additional CAM therapies for chronic musculoskeletal pain management that are not listed in the previous question?

Yes (please specify)

No

Section3_SecondHalf

While using one or more of these CAM therapies, your pain symptoms have generally:

	Gotten worse	Stayed the same	Improved somewhat	Improved significantly	Improved completely
Please select 1 answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For how long have you been using CAM therapies for your chronic musculoskeletal pain? (please list years and months in the boxes below)

Years

Months

How did you first learn about CAM therapies? (choose one)

- Continuing education course
- Dental hygiene school
- Friend or family member
- Internet
- Nurse
- Personal trainer/coach
- Physician
- Physician's assistant
- Television
- Other (please specify)
- Don't recall

Please indicate your level of agreement with the following statements.

Using Complementary and Alternative Medicine therapy for my chronic musculoskeletal pain has:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. Contributed to my overall career satisfaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Contributed to my career longevity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Contributed to my overall health and well-being.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Helped me work the					

number of hours I want to work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Helped me feel more secure and happy in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 4 and 5

Section 4: Attitudes and Opinions about Complementary and Alternative (CAM) Therapies.

The following questions will include the term Complementary and Alternative Medicine (CAM). If you are unfamiliar with this term, the definition is listed below.

Alternative Therapy is defined as non-conventional therapy used in place of (instead of) conventional or more traditional therapy or treatment.

Complementary Therapy is defined as non-conventional therapy used in addition to treatments prescribed by your doctor.

Complementary and Alternative Medicine (CAM) is defined as either or both.

Please indicate your level of agreement with the following statements.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. I would use CAM for chronic musculoskeletal pain management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I would recommend a friend or family member use CAM for chronic musculoskeletal pain management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I know dental hygienists who have used CAM for chronic musculoskeletal pain management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. CAM therapies are acceptable for chronic musculoskeletal pain management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I would use CAM in addition to conventional medicine to manage chronic musculoskeletal pain.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
f. I would use CAM as an alternative to conventional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

medicine to manage chronic musculoskeletal pain.

g. CAM should be covered by medical insurance.

h. My dental hygiene training included classroom lectures on ergonomics.

i. While working with patients in the clinic, my instructors reinforced ergonomics.

j. Overall, I am satisfied in my career as a dental hygienist.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 5: Please describe yourself.

What is your age? (please indicate in years below)

Age

What is your gender?

- Female
- Male

What is your race?

- Multi-Racial
- African American
- American Indian
- Asian (including India)
- Pacific Islander
- White
- Other (please specify)
- Decline to answer

What is your ethnicity?

- Hispanic
- Non-Hispanic

Decline to answer

What is the highest dental hygiene degree you have earned?

- Certificate
- Associate
- Bachelor of Science
- Master's
- No degree in dental hygiene yet, I am a student

In what year did you earn this degree? (please indicate in the box below)

Year

How long have you been employed as a dental hygienist? (please list **years and months** in the boxes below)

Years

Months

How many hours in 1 week, on average, do you work in direct patient care? (please list **hours** in the box below)

Hours

What is your primary practice setting? (Where you work the majority of your hours)

- Corrections facility
- Dental hygiene education program
- Dental hygiene independent practice
- General dental practice
- Hospital dentistry
- Industry
- Pediatric dentistry
- Periodontics
- U.S. Military
- Veteran's administration

Other (please specify)

In which state is this practice located?

California

North Carolina

Other (please specify)

How many hours in 1 week, on average, do you work outside of direct patient care? (please list hours in the box below)

Hours

Do you routinely see a primary care or other physician?

Yes

No

On average, how frequently do you see a primary care or other physician?

Every 2+ years

Once a year

Twice a year

3+ times a year

Please rate your overall health.

Excellent

Good

Fair

Poor

Please add any comments about this survey topic in the box below.

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