

THE EFFECTS OF YOGA ON PATIENTS

WITH CHRONIC PAIN

by

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### ABSTRACT

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Chronic pain is a challenging and costly medical problem. Interest has increased in the use of complementary alternative medicine (CAM) as a cost-effective way to manage chronic pain. The present program was initiated to assess the effects of Hatha yoga on patients with diagnoses of fibromyalgia or osteoarthritis with chronic pain. Pain and life interference ratings were examined pre and post yoga sessions, using the Brief Pain Inventory. Worst, least and current pain levels were found to decrease after the yoga sessions along with a decrease in normal work interference and enjoyment of life interference. Alternative explanations due to selection and experimental mortality could not be ruled out. A one group pre/post design was used. There was no control group. Study limitations and further research implications are discussed.

## ACKNOWLEDGMENTS

This project was completed in cooperation with a local HMO. Dr. Richard J. Tafalla was the main advisor and Mrs. Rhonda Thorson was the project facilitator. Their assistance was invaluable in making the project a learning experience as well as providing indicators for further studies in the area of chronic pain.

Dr. Charles S. Cleeland of Houston, Texas gave permission for the reproduction of his Brief Pain Inventory.

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## CHAPTER I: INTRODUCTION

The following report is based on a trial program using Hatha Yoga for patients with chronic pain as a result of having a diagnosis of either fibromyalgia (FMS) or osteoarthritis (OA).

### *Statement of the Problem*

The increasing cost of managing chronic pain and the increased numbers of patients suffering is causing providers to consider the effectiveness of Complementary Alternative Medicine (CAM).

### *Purpose of the Study*

The purpose of this study is to examine a small pilot program on the effectiveness of yoga to decrease chronic pain and to determine whether a larger evaluation is merited.

### *Assumptions of the Study*

It is assumed that not many chronic pain patients have experienced the benefits of yoga exercises that therapists believe will help them. It is also assumed that yoga exercise programs are cost effective in comparison to other methods of treating chronic pain.

### *Definition of Terms*

*BPI*            *Brief pain Inventory is an assessment tool used for the evaluation of pain using self-report measures.*

*CAM*            *Complementary Alternative Medicine.*

*Fibromyalgia* *A syndrome that includes symptoms of widespread pain and tenderness with no obvious inflammation or destruction in the body and of unknown etiology.*

*Hatha Yoga* The most familiar type of yoga in the US, which incorporates attention, non-reactive awareness, breathing, deep relaxation, alignment and moving and stretching.

*IASP* International Association for the Study of Pain

*NCCAM* National Center for Complementary and Alternative Medicine

*Osteoarthritis* A condition that results in joint deterioration and chronic irritation and pain.

*Pain* An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (IASP, 1994)

#### *Limitations of the Study*

The small sample size and lack of a control group limits the interpretation of the data and ability to strongly recommend yoga before a full-scale study can be completed. There were 250 invitations sent and 16 respondents. This small sample results in information that cannot be used for any serious conclusions, but rather, as indicators of trends for further study.



*Methodology*

Members of an HMO were invited to participate in yoga for chronic pain intervention. Sixteen members volunteered to participate and all sixteen were chosen. A one group pre/post design was used with no control groups. Pain self-report perceptions and life interference perceptions among participants were self-rated before and after a yoga intervention program. The instrument used was a replication of the Brief Pain Inventory (BPI). Completers and dropouts were compared for differences. Non-parametric tests were used for the comparisons. Qualitative reporting was done on diagnoses, medication use and the use of other therapies.

## CHAPTER II: LITERATURE REVIEW

One out of every five Americans experience chronic pain and costs the country \$100 billion a year, which includes lost workdays (Page, 2002). The problem is not only economic. Chronic pain is a major medical, social and personal problem that causes the sufferer physical, emotional and spiritual damage (MacDonald, 2000). Chronic pain is one of the most challenging and costly problems in medicine today. Conventional medicine has effectively provided emergency and acute care for patients, but is not as successful in alleviating the symptoms of chronic diseases or improving the quality of life in these patients. As a result, more patients are becoming interested and involved in alternative methods of managing their diseases (Roberts, 2003). In addition, health professionals and insurance companies are searching for pain-control therapies that are cost effective, accessible, safe and have long-term effectiveness for their patients.

The number of chronic pain sufferers is increasing along with the increase in medical costs. At the Lovelace Clinic Foundation in Albuquerque, New Mexico, direct medical costs for patients with osteoarthritis (OA) and chronic back pain (CBP) were compared to similar patients without these diagnoses (Mapel, Shainline, Paez, & Gunter, 2004). Patients with OA or CBP were three times more likely to be admitted to the hospital, their outpatient costs were more than doubled, and prescription drug costs were higher by 102%. Health services and prescription medication costs for these patients were more than double those of matched controls. Health insurance companies and healthcare professionals are aware of the costs of current chronic pain treatments. It is possible that complementary alternative therapies are more economical, with most

therapies not costing more than \$160 for an initial consultation and treatment (Long, Huntley & Ernst, 2001)

Outcome research reports the results of certain therapies and the effects it has on certain patients. The treatment that works the best for specific problems is the concern of insurance companies, employers, government and consumers and on which they base their health care decisions (Fishbain, 2000). Treatment outcomes can determine effectiveness, benefits, costs and patient satisfaction. The research looks at functional status, health status and quality of life, longer life, freedom from pain, increased function and independence. These are the outcomes that are important to patients and health care providers (Fishbain, 2000).

#### *Types of Pain Defined*

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience arising from actual or potential tissue damage or described in terms of such damage” (Merskey & Bogduk, 1994, p.210) McCaffery has also explained pain as whatever the experiencing person says it is, existing wherever he or she says it does (McCaffery, 1999). Chronic pain is a universal experience and is now seen as an illness of its own and not only a symptom of a disease (Larkin, 2001) (Rome, 2002). The World health Organization defines health as a state of complete physical, mental, or social wellbeing and not merely the absence of disease. Pain is an obvious threat to our health (as defined by WHO), as it threatens our physical, mental and social well-being. The American Pain Society has declared pain to be the fifth vital sign and should be assessed every time patients’ vital signs are checked, right along with temperature, blood pressure, pulse and respirations (Rome, 2002).

There are three main categories of pain: acute, nonmalignant chronic pain and malignant (cancer) pain. Acute pain occurs immediately after an obvious injury and is considered a symptom and a warning that alerts the person to attempt to remedy the injured area. Healing is expected and facilitated by repair, protection, rest, and pain medications (Barker, 2002). The word *acute* comes from the Latin “needle” and refers to a sharp pain (Rome, 2002). Cancer pain is progressive and terminal and requires a holistic approach. The patient must be assessed for physical, emotional, interpersonal and spiritual pain. Treatment includes symptomatic interventions for whatever the patient is experiencing (Storey, 1996). Chronic pain is pain that continues after the expected healing has taken place or occurs without obvious tissue damage. Pain is considered to be chronic once it has continued for over six months (Rome, 2002). *Chronic* comes from the Greek word for “time” (Rome, 2002).

Once pain becomes chronic, it is obvious that the treatments used for acute pain may no longer apply. There may be nothing to mend or splint, and continued rest or avoidance of that area only contributes to deconditioning, which is a deterioration of strength and muscle mass. Unrelieved chronic pain has negative effects on every system in the body, including cardiovascular, circulatory, pulmonary, endocrine, gastrointestinal, central nervous system, renal, immunologic and skeletal effects (Barker, 2002).

Chronic conditions lasting a year or longer, put specific limitations on a patients’ quality of life and certainly requires medical care (Anderson, 2002). Our health care system does not place a high priority on preventive care or on slowing the progression of diseases (Anderson, 2002). It is largely a medical model with a reimbursement system that is more available for acute and institutional care than in preventive or community-

based care (LaForce & Wussow, 2001). Current data tells us that with 125 million people suffering from chronic illnesses in 2000, that the expected progression for 2020 will be an estimated 157 million (Hoffman, 1999). Changes are necessary to meet this need, to offer preventive measures, holistic alternatives and lifestyle changes for coping with chronic illnesses and chronic pain.

The cycle of chronic pain can lead to changes in the body, brain and behaviors that ultimately increase the pain perceptions. This cycle begins in the nervous system, where the initial messages were sent and disperses throughout the body to result in muscle tenseness, mental stress, depression, disturbed sleep and posturing problems in an attempt to protect the painful area. Learning to break this cycle enables the person to cope with or live well in spite of the chronic pain (Fischman, 2000).

#### *Fibromyalgia and Osteoarthritis*

Two examples of chronic illnesses that result in chronic pain and ongoing medical care are fibromyalgia (FMS) and osteoarthritis (OA).

Fibromyalgia is a syndrome that includes symptoms of widespread pain and tenderness with no inflammation and no destruction of joints, organs or tissue. It is a chronic musculoskeletal pain and fatigue disorder with unknown etiology (Rogers, 2000). It is considered a syndrome rather than a disease, because no specific cause has been found and it is different for each individual. It is, however, the number one cause of chronic pain for patients in the Mayo Clinic Rehabilitation Center in Rochester, Mn. (Rome, 2002).

In a Needs Assessment study for FMS, the recommendations and conclusions cited stretching techniques, deep breathing, visualization, meditation, autogenic training

and progressive relaxation as strategies for coping with FMS. It is also recommended that demanding exercises should be avoided (Rogers, 2000). The population assessed in this study was from Illinois, 94% female, 64% between 36 and 56 years of age and 99% with at least a high school education (Rogers, 2000).

Osteoarthritis (OA) affects nearly 50 million Americans. It is a condition that results when cartilage in the joints deteriorates and results in bone rubbing on bone, causing irritation and pain (Thompson, McFarland, Hirsch & Tucker, 1997). Unlike fibromyalgia, it can be more easily diagnosed, as there is progressive damage to the joint cartilage. OA is a disease of older people and women primarily. Aerobic exercises in water are recommended, along with rest and modified weight-bearing activities. The maintenance of joint functions and mobility are a challenge with OA. Proper posturing when walking, standing or sitting, to aid in proper muscle use is stressed. The person must be encouraged to perform usual activities of daily living for self-esteem and to maintain fitness and strength. While medications are used to decrease OA pain, other therapies must be considered to avoid over-medication and side effects from the medications as well (Thompson, et al., 1997).

Both of these conditions of chronic pain lead to inactivity, increased doctor visits, isolation, sleep problems, emotional upheaval, depression, difficulties at work, financial strain, damaged relationships, and possibly chemical dependency (Rome, 2002). Physical dependency on medications themselves can lead to impaired mental functioning, physical complications such as liver or kidney involvement. Dependency can also be a precursor to emotional distresses such as anxiety, irritability, apathy and depression (Rome, 2002). Because of this all-encompassing involvement in the quality of life,

chronic pain is a serious condition. It is costly above and beyond the causative disease itself. The 2001 European Week Against Pain highlighted the magnitude of chronic pain and the number of people affected by it. It was compared to all of cancer and cardiovascular disease and the need to change attitudes to address the problem in a focused manner was emphasized (Larkin, 2001). U.S. Congress has declared this decade as the Decade of Pain Control and Research (Rome, 2002).

### *Pain Treatment Facilities*

Pain treatment facilities developed to help people decrease their levels of pain, because a very large percentage of the population was experiencing chronic pain. It was also realized that a coordinated team was required to manage different types of pain (Fishbain, 2000). John Bonica first formalized the idea of pain management as a multidisciplinary diagnostic and therapeutic endeavor as early as 1953 (CARF, 2001), but it wasn't until the 1970's that the multidisciplinary pain centers evolved (Fishbain, 2000).

Pain rehabilitation centers have attempted to focus on the multidimensional aspects of pain management. At Milwaukee's Columbia Hospital, chronic pain is met with a variety of treatments including relaxation techniques, physical therapy, psychotherapy and medications. The medications include analgesics and other medications normally used to treat epilepsy or depression (Fischman, 2000). This program appears to be working. Its' main purpose is to break the pain-stress cycle anyway it can. Psychologist Dennis Turk, of the University of Washington in Seattle, reported that fewer than 17% of the patients who participated in the multidisciplinary program were hospitalized within a year, while 40% of the single-therapy patients were hospitalized within that year (Fischman, 2000). The percentage of patients who remained

on opioids after one year was less in the pain clinic group than those who participated in a single therapy. Norman Harden of Chicago's rehabilitation institute explains that chronic pain has many dimensions that require addressing. These dimensions include the physical, psychological and social aspects of a patient's life. Helping people realize that their pain isn't a signal of danger can help in breaking the pain-tension cycle (Fischman, 2000).

Today, there are 1500-2000 pain clinics in the United States that differ in size, philosophy, staff composition and treatment approach (Fishbain, 2000). The Fishbain study identified four types of pain facilities. There are *Modality-oriented clinics*, which provide specific treatments such as nerve blocks, nerve stimulation, acupuncture or biofeedback. There is the *Pain clinic* that will focus on the diagnosis and management of chronic pain, but is not comprehensive in that it does not supply consultative or therapeutic services or comprehensive assessment or treatment. The *Multi-disciplinary pain clinic* includes multi-disciplinary diagnosis and management of chronic pain patients and is staffed by a multi-disciplinary team, but does not include research and teaching. A *Multi-disciplinary pain center* is usually a part of a medical school or a teaching hospital and does include research and teaching along with the multi-disciplinary team approach to patients with acute or chronic pain as it offers both inpatient and outpatient programs (Fishbain, 2000). The study presented strong evidence for the effectiveness of some chronic pain treatments, but was unable to identify which combinations of treatments were effective. Therefore, it was suggested that more outcome studies with appropriate control groups would be necessary. Specific pathology should be controlled for with outcome studies defining their chronic pain treatment group using ICD-9 coding and



having standardized outcomes (Fishbain, 2000). One of the conclusions of that study was to make physicians aware of the fact that not all pain facilities are equal and do not use the same treatments or combinations of treatments (Fishbain, 2000).

In a study done by Miller (2000), patients with chronic pain who were treated at a multidisciplinary pain treatment center were given the Pain Locus of Control Scale and the Survey of Pain Attitudes before and after participating in a 40-hour per week, 4-week program. Patients did increase their perception of personal control over their pain after participating in the program. The success of the program was determined by this increased perception of control (Miller, 2000).

#### *Complementary Alternative Medicine (CAM)*

Our current biomedical system does not often take into account the power of the personal and spiritual realms of human experience and how that relates to clinical status and natural laws (Micozzi, 1996). The new philosophy of medicine should consider the differences between metaphysical reality and the existing scientific models. One way to better understand alternative medicine is to focus on the physiologic response of the individual body. It is important too explore opportunities to practice and understand alternative medicine as an entire system of intellect, history and practice (Micozzi, 1996).

Ongoing research is being examined to find positive results from alternative or complementary/alternative therapies. Some positive results were found with exercise programs in improving fitness, counteracting unhelpful beliefs and improving stress levels (Hall, 2003). A survey on chronic pain management, found that physicians believed that patients currently received sub optimal management and that optimal control of symptoms occurred in less than half of their patients. The barriers to good pain

control were identified as adverse side effects from present therapies, patient non-compliance and lack of availability of certain therapies (Stannard & Johnson, 2003).

Those physicians also believed that chronic pain management could be improved in their areas and they were also interested in relevant training.

The use of complementary/alternative medicine has been increasing in the past decade. Most commonly, these therapies are being used to treat chronic pain, which is the most prevalent threat to good health today. In the United States, 42% of adults experience daily pain (Vallerand, Foulabakhsh & Templin, 2003). In a survey of 595 participants from southeastern Michigan, it was reported that 76% of them used some form of complementary/alternative medicine. Treatments used were hot or cold packs, yoga, exercise, stretching, chiropractic treatments, massage, magnets, biofeedback, relaxation, prayer or meditation, healing touch and other modalities (Vallerand, et al, 2003). Yoga showed to be one of the most frequently practiced therapies with 15% of the rural population, 56% suburban and 46% of the urban respondents used it for the self-treatment of pain (Vallerand, et al, 2003).

### *Yoga*

Yoga is an ancient practice of relaxation, exercise and healing that is a union of mind, body and spirit philosophy. Yoga involves specific movements, breathing and relaxation exercises most often used to relieve the natural buildup of stress in our lives. Yoga can help people learn to control and manage their stressors (Schivapremananda, 1997). Yoga is currently being studied by the National Center for Complementary and Alternative Medicine (NCCAM) for its effectiveness for chronic low back pain, insomnia and shortness of breath in Chronic Obstructive Pulmonary Disease (COPD) (Clinical

Trials.gov, 2004). Hatha Yoga is the most commonly used in the United States and includes attention, non-reactive awareness, breathing, deep relaxation, alignment, and moving and stretching for increased wellness. Hatha Yoga is thought to influence increased breath capacity, improved action of internal organs, increased flexibility and concentration. It also is thought that those practicing yoga can consciously learn to calm their parasympathetic nervous system (Devi, 2000).

According to Dr. Emmanuel Brandeis of West Hollywood California, there is much research being done on yoga, but not in the United States (Lipson, 1999). Practitioners are crediting yoga for helping with back problems, menstrual problems, arthritis and chronic pain. Insurance companies are becoming more likely to accept yoga as a legitimate therapy if research can document its effectiveness (Lipson, 1999).

Researchers say that the practice of yoga can ease chronic pain (Martin, 2001). Sonia Gaur of Harbor-UCLA Medical Center's department of psychology recruited 18 volunteers with chronic pain. They participated in 90-minute yoga sessions three times a week for four weeks. Gaur asked the participants to rate their mood and the severity of their pain at the end of each week. Most of these participants had decreased their level of pain enough to ask their physicians to decrease the amount of their pain medications also (Martin, 2001).

At the University of Pennsylvania School of Medicine and the Arthritis Immunology Center in Philadelphia, PA, patients with OA of the hands were studied to observe the effects of yoga on their pain, strength, motion, joint circumference, tenderness and hand function. Twenty six subjects were randomly assigned to control and experimental groups for all phases of the program. Significant improvement was

seen in an overall multivariate test for the right hand, range of motion for the right hand and less tenderness in both hands. Hand pain during activity was also significantly decreased for combined hands. All were significant at  $p < .01$  (Garfinkel, Schumacher, Husain, Levy & Reshetar, 1994).

A similar program by Haslock, Monro, Nagarathna, Nagendra and Raghuram, conducted in 1994 tested 20 volunteers with rheumatoid arthritis. Ten volunteers participated in a yoga program and the other 10 acted as the control group. Participants were assessed on ring size, duration of morning stiffness, grip strength and depression. There were no significant differences in the levels of depression between the groups. The yoga group did have a significant increase in left hand grip and an improvement in right hand grip which was not significant. Left hand ring size decreased, but not significantly and other measures remained constant. Six patients completed that program, and although the results of that study were too small for definitive conclusions, there were positive results and all six who completed the program received enough benefits to want to continue with yoga (Haslock, et al, 1994).

A study at the University of Pennsylvania School of Medicine, involving a yoga group with osteoarthritis of the hands, compared with a control group, showed improvement in pain during activity and tenderness and finger range of motion improvement in the yoga treated group. This study was published in the Journal of Rheumatology in 1994 (Lipson, 1999).

At the Pain Center of the Texas Tech University Health Sciences Center, Dr. Patrick Randolph, PhD, studied the effects of yoga on fibromyalgia and found a double benefit. He found that they experienced increased circulation to their limbs and reduced

anxiety after practicing yoga (Lipson, 1999). This was a randomized, single-blind, controlled clinical trial and the changes in grip strength and pain were significantly improved for the yoga groups but not significant for the control subjects. Dr. Randolph believed that yoga helped patients to combine mind and body to relieve themselves of the unnecessary emotions and worries that accompany pain. Further studies are required to examine long term effects and to compare yoga with other pain therapies and treatments (Lipson, 1999).

In a survey of the opinions of professional organizations, certain complementary therapies were believed to be suited for specific medical conditions. Along with other therapies, yoga was felt to be beneficial for stress/anxiety, headaches/migraines, back pain, respiratory problems, insomnia, cardiovascular problems and musculoskeletal problems (Long, 2001). It must be noted that this survey showed “beliefs” of professionals, not the results of empirical study. But it does show that professionals have positive attitudes toward complementary therapies and do believe they have potential benefits.

The International Association for the Study of Pain (IASP) acknowledged the benefits of therapeutic and strengthening exercises to avoid loss of strength, stiffness, contractures, decreased cardiopulmonary endurance and metabolic changes that often accompany chronic illness (Vasudevan, 1997). In 1993, the IASP stated that pain accounts for over 70 million office visits to doctors each year in the United States (Turk, 1993).

Research in the United States on the effects of yoga is in its’ infancy. The yoga studies examined were all small, and few have used no-treatment or placebo control

groups. They have, however, shown improvements with some of them being statistically significant. There are difficulties in avoiding experimental mortality because the yoga experiments rely on volunteers and in keeping the experimental and control groups equal. This pilot experiment was conducted to determine if a larger controlled study on the effects of yoga on chronic pain would be merited.

### CHAPTER III: METHODOLOGY

Chronic pain is considered a major health problem in the United States today, accounting for billions of dollars spent in the attempt to manage it. This study was done to provide some indications that yoga can decrease chronic pain perceptions and pain interference perceptions in chronic pain patients. This chapter includes subject selection and description, instrumentation, data collection procedures, key elements of the intervention, data analysis and limitations of this investigation.

#### *Subject Selection and Description*

Participants were members of an HMO identified as having a diagnosis of either fibromyalgia or osteoarthritis. Two hundred and fifty members qualified to receive the invitation to participate in the yoga program and sixteen agreed to participate. This population was located in northwest Wisconsin and all participants were commercial payers of their health plans. The final sample included 14 (87.5%) females and two (12.5%) males that ranged in age from 33 to 61 (mean 51). Nine participants had the diagnosis of fibromyalgia, two were diagnosed with osteoarthritis, three had both diagnoses and two had fibro-related diagnoses. All patients had co-morbidities. One participant was diagnosed as having schizophrenia, borderline personality and depression, but this participant did complete the program successfully. Four others had a diagnosis of depression and two of those completed the yoga sessions and two did not. Of the 16 participants who began the yoga program, 11 completed at least 18 of the 22 sessions, which was considered the requirement for data comparison and successful completion of their original commitment.

### *Instrumentation*

A pre-yoga and post-yoga survey was presented to the participants (See Appendix A). This survey was based on the Brief Pain Inventory (BPI) instrument that measures location and intensity of the pain and pain interference with activities (Daut, Cleeland, Flanery, 1983). (See Appendix B). The development of the BPI focused on the ability to measure pain prevalence and severity and the need to be able to administer this questionnaire easily to a large number of people. It was required to be brief, easily understood and able to be self-administered. This questionnaire was administered to more than 1200 patients of the Wisconsin Clinical Cancer Center in Madison, Wisconsin to be tested for validity and reliability in 1982 (Daut, et al, 1983). Higher reliability was found for the pain items when the testing and retesting interval was short which was attributed to the actual fluctuations of pain. Correlations when the interval was short were .93 for worst pain, .78 for usual pain and .59 for current pain. Correlations for the longer interval were .34 for worst pain, .24 for usual pain and .22 for current pain (Daut, et al, 1983). Validity was examined by comparing medication use to overall pain ratings. Patients receiving non-narcotic medications rated their pain higher than patients taking no medications and patients taking narcotics had the highest pain ratings. Those findings were significant at  $P < 0.002$ . Interference ratings were also compared to pain levels and the higher interference ratings were found with the higher pain ratings. Mood, walking, sleep, work and enjoyment of life interference ratings were significantly related at  $P < 0.001$  and social relationships related to the worst pain ratings at  $P < 0.05$ . It was found that the relationship between usual pain ratings and interference ratings were not significant, which was expected (Daut, et al, 1983). The BPI was also found to be



sensitive to the differences in pain as it related to specific diseases. Although the BPI does not measure emotional significance or pain behaviors, the BPI has been considered to be a valid and reliable instrument for the measurement of pain (Daut, et al, 1983).

In a German study, the BPI was suggested to be useful in evaluating palliative care patients, as it is accurate and easy to use (Radbruch, Loick, Kiencke, Lindena, Sabatowski, Grond, Lehmann & Cleeland, 1999). A Taiwanese study concluded that the BPI was reliable for cancer pain severity and its interference (Ger, Ho, Sun, Wang, Cleeland, 1999). The alpha coefficient for internal reliability was 0.81 for the severity scale and 0.89 for the interference scale (Ger et al, 1999). In the German study, the BPI and other pain interference measures had a range of correlations from 0.58-0.62 (Radbruch et al, 1999). Test and retest reliability had a range of 0.79-0.97 for the pain severity scale and 0.81-0.97 for the pain interference subscale of the BPI (Radbruch et al, 1999).

The questionnaire used for this study did not exactly replicate the Wisconsin Brief Pain Inventory, but all of the questions used were taken from that instrument. Patients were asked their ages, the date of the testing and then the pain scale rating their worst, least, average and current pain levels. The second part of the questionnaire asked what treatments and medications they were using, dosages and frequency of use and percentages to reflect how much the medications helped alleviate the pain. The remaining questions dealt with interference ratings of general activity, mood, walking ability, normal work, relations with other people, sleep and enjoyment of life. The entire Brief pain Inventory (short form) was not replicated. There was also an error on the survey that resulted in not being able to utilize that variable for analysis.

### *Data Collection Procedures*

A pre-test, post-test one group quasi-experimental design was employed. A 17-part paper and pencil questionnaire was self-administered both before and after the yoga intervention. The questionnaires were personally distributed by the yoga instructor at the first or second yoga session and again when the participant had completed at least 18 of the 22 required sessions. All participants completed the questionnaires independently and submitted them to the yoga instructor.

### *Intervention*

Key elements of the yoga intervention include:

- 1) The group format: The group format usually increases the efficiency of patient education. Four to eight participants were in each group. There seemed to be more camaraderie in the Tuesday group vs. the Friday one. Group support can enhance individual motivation and compliance.
- 2) Expectations: Yoga was presented with the suggestion that it could relieve some pain or at least improve the quality of life and the ability to move with less pain. This could have had a positive placebo effect.
- 3) Self-responsibility: Members were encouraged to make yoga a daily part of their lives. They were shown the exercises once a week, but were expected to practice them at home along with proper posturing and breathing techniques on a daily basis.
- 4) Flexibility: The program was flexible enough to allow for individual changes in the exercise program to accommodate individual needs. Members were

encouraged to do what they could rather than worry about what they could not do.

This may help to formulate a positive attitude toward the exercise program and pride in what participants were able to do.

- 5) Repetition: Various themes recurred during the exercise times. Posturing, relaxation, deep breathing, and inner concentration were some of the themes. Repeated education can facilitate patient compliance.
- 6) Length of the program: The program was available for seven months to all participants. This was long enough to establish a pattern or a habit and a personal understanding of the benefits of yoga. By this time, the members were able to have experienced some pain relief and increased flexibility along with the realization of the benefits of daily exercise, improved breathing patterns and posturing. It was the goal of the program to encourage patients to continue with the yoga exercises indefinitely, either at home or at the yoga center.
- 7) Affordability: All sessions ordinarily cost \$11.50 for the 90 minutes at that time. The participants all contributed \$100 at the beginning of the sessions which was refundable if they completed 18 sessions or more, and there was no charge for them to participate in the program. It was understood, that to continue with yoga at the center, that they would then be responsible for the cost after the completion of the HMO project.

### *Data Analysis*

The Statistical Program for Social Sciences, version 12.0, (SPSS, 2003) was used to analyze the data. Non-parametric analyses were done because the small sample size could not ensure that the data was normally distributed. The Mann Whitney U was used for independent samples comparisons and the Wilcoxon matched-pairs signed-ranks test was used for paired samples. An interference score was determined by combining all seven of the interference questions. Comparisons were made of worst, least, average and current pain ratings pre and post yoga intervention to look for significant positive changes. Comparisons were also made on all of the life interference measures. A qualitative report was compiled to list alternative therapies and medications used by participants.

### *Limitations*

The participant number is too small to make any robust assumptions or declarations, but the entire process is a stepping-stone for further study. There also was no control group for comparisons. The dropouts were used post-hoc as a comparison group and no differences were found between them and the completer group, but this grouping was also small. All of the analyses showed indications and trends that the yoga intervention had positive results on pain ratings and pain intervention ratings. It is virtually impossible to isolate specific diseases such as fibromyalgia and osteoarthritis and all patients did have numerous co-morbidities. However all participants did have either or both of these diagnoses. All volunteers who responded to the invitation were chosen to participate, which eliminated any random selection. Increased participation with a more random selection could result in more robust statistical analyses.

The number of sessions was controlled, the time of day, the setting and the group selection. The participants were divided into a Tuesday and a Friday group by their own choice with the Tuesday group being considerably larger. Few men were used in this study and minorities were not identified if there were any. The results are limited to primarily white females with a mean age of 51. All participants were commercial payers, which may account for some of the successes of the program.

### *Summary*

The valid and reliable Brief Pain Inventory was used for this pre-test, post-test one group design. The test was self-administered to 16 members who volunteered to participate in the yoga exercises. The yoga was taught in a yoga center in a group format. It was expected that the exercises would lower pain perceptions and interference with activities of daily living. There was also an expectation that members would practice the exercises independently at home during the week. The sessions were free to these volunteers although there was a \$100 incentive that had to be paid in the beginning which was refunded after at least 18 of the 22 sessions were completed. Data was analyzed using SPSS, the Mann Whitney U test and the Wilcoxon for matched pairs. The number of participants was small, therefore only trends and indications could be reported.

## CHAPTER IV: RESULTS

Comparisons were made between pain ratings before and after the yoga intervention to determine significant reduction in pain ratings. Comparisons were also made using independent interference measures and a composite interference score. Participants who completed the program were compared using their pre-yoga and post-yoga pain and interference ratings and their interference scores. Because of experimental mortality, it was also important to determine if dropouts in this program differed in their diagnoses, pain ratings or interference ratings from completers. All test data was examined.

### *Item Analysis*

In order to determine whether completers and dropouts differed on diagnoses, a cross tab table was constructed examining diagnoses for both members who completed the yoga intervention and those who dropped out.

Table 1

Diagnoses for completers vs. dropouts.

Diagnosis	Completed	Dropped out
Fibromyalgia	5	4
Osteoarthritis	2	0
Both	2	1
Neither	2	0

No inferential statistics could be calculated as cells were too small, but Table 1 shows that most completers had fibromyalgia and that all dropouts did as well.

Table 2 shows the mean pain scores for completers and dropouts.

Table 2

Pre-test pain ratings completed vs. dropouts.

Variable	<i>n</i>	M	SD
Pre-worst pain			
Completed	11	4.9	2.0
Dropouts	5	5.2	3.0
Least pain			
Completed	11	2.2	1.7
Dropouts	5	2.4	1.3
Average pain			
Completed	11	3.8	1.3
Dropouts	5	4.2	2.4
Current pain			
Completed	10	2.8	2.1
Dropouts	5	4.4	2.7

The small sample size and population distribution made this data inappropriate for the independent t-test, therefore the non-parametric Mann-Whitney U test will be used to determine differences between completers and dropouts' pain ratings. All mean pain ratings on this table were higher for dropouts than for completers.

Table 3 shows mean ranks for completers vs. dropouts and Mann Whitney U tests for worst, least, average and current pain variables. The mean (from Table 2) of worst pain rating is higher for dropouts than completers, although the Mann Whitney U test was not significant. Least pain mean ratings are higher for dropouts than completers, but not significant. Average pain mean ratings are higher for dropouts than for completers, but not significant. Current pain mean ratings were higher for dropouts than completers, but not significant. No differences were seen between dropouts and completers on these variables.

Table 3

Mann Whitney U comparison pain ratings completers vs. dropouts

Variable	N	Mean Rank	Sum	U
<b>Pre-worst pain</b>				
Completed	11	8	88	22 ns
Dropouts	5	6	48	
<b>Pre-least pain</b>				
Completed	11	8	88	22 ns
Dropouts	5	9.6	48	
<b>Pre-average pain</b>				
Completed	11	7.59	83.5	17.5 ns
Dropouts	5	10.50	52.50	
<b>Pre-pain right now</b>				
Completed	10	6.85	68.50	13.5 ns
Dropouts	5	10.30	51.50	



Mean interference scores for completers and dropouts are seen in Table 4. Table 5 shows

the mean rank tests for those variables.

Table 4  
Compared pre-test interference ratings completers vs. dropouts.

Variable	<i>n</i>	M	SD
Activity interference			
Completed	10	3.40	1.96
Dropouts	5	5.00	2.92
Mood interference			
Completed	11	3.73	2.94
Dropouts	5	4.80	3.27
Walking interference			
Completed	11	3.36	2.54
Dropouts	5	2.80	2.17
Normal work interference			
Completed	11	3.64	2.01
Dropouts	5	5.20	3.03
Relationship interference			
Completed	11	2.55	2.91
Dropouts	5	3.60	2.88
Sleep interference			
Completed	11	3.18	2.89
Dropouts	5	5.80	3.35
Enjoyment of life interference			
Completed	11	4.73	2.72
Dropouts	5	5.40	3.29

**Table 5**

Mann Whitney U test for interference ratings completers vs. dropouts

Variable	N	Mean Rank	Sum	U
Activity interference				
Completed	10	6.75	67.5	12.5 ns
Dropouts	5	10.50	52.5	
Mood interference				
Completed	11	7.91	87	21 ns
Dropouts	5	9.80	49	
Walking interference				
Completed	11	8.68	95.5	25.5 ns
Dropouts	5	8.10	40.5	
Normal work interference				
Completed	11	7.41	81.5	15.5 ns
Dropouts	5	10.90	54.5	
Relationship interference				
Completed	11	7.95	87.5	21.5 ns
Dropouts	5	9.70	48.5	
Sleep interference				
Completed	11	7.32	80.50	14.5 ns
Dropouts	5	11.10	55.50	
Enjoyment of life interference				
Completed	11	7.86	86.50	20.5 ns
Dropouts	5	9.90	49.50	

Comparing interference ratings using the Mann-Whitney Test indicated that there were no significant differences between completers and dropouts. The mean for activity interference for completers was less than that for dropouts, but it was not significantly different. Mood interference mean for completers was less than dropouts, but not significant. Walking interference mean for completers was slightly higher than that of dropouts and not significant. Normal work interference mean for completers was less than dropouts, but was not significant. Relationship interference mean for completers was less than that of dropouts, but not significant. Sleep interference for completers was less than that of dropouts, but not significantly so. Enjoyment of life interference was less for completers than that of dropouts, but also not significant.

A composite interference score was calculated by adding together the interference questions. This interference score has been previously calculated in other studies and found to have an alpha reliability of .89 in the Taiwanese study (Ger, et al, 1999) and .81-.97 in the German study (Radbruch, et al, 1999). The alpha coefficient for internal reliability in this study was .855 for the interference score with all questions included. The questions are seen in Table 6.

**Table 6**

Interference measures: 0=does not interfere and 10=completely interferes  
 Circle the one number that describes how, during the past 24 hours, PAIN HAS  
 INTERFERED with your:

1. General activity (0-10)
2. Mood (0-10)
3. Walking ability (0-10)
4. Normal work (includes both work outside the home and housework) (0-10)
5. Relations with other people (0-10)
6. Sleep (0-10)
7. Enjoyment of life (0-10)

Table 7 shows the means for the interference scores for completers and dropouts.

**Table 7**

Comparison pre-test interference scores completers vs. dropouts

Variable	n	M	SD
Interference scores			
Completers	10	25	11.5
Dropouts	5	32.6	19.0

The mean interference rating for those who completed the program was lower (25) than that of those who dropped out of the program (32.6).

**Table 8**

Mann Whitney U comparison interference scores completers vs. dropouts

Variable	n	Mean Rank	Sum	U
Completers	10	6.8	68.0	13 ns
Dropouts	5	10.40	52.0	

Comparing interference scores using the Mann-Whitney U Test indicates no significant differences between completers and dropouts of the yoga program even though dropouts mean was higher than completers.

#### *Summary*

The data shows that there were no significant differences between those who completed the program and those who did not in the areas of diagnoses, pain ratings and interference ratings. Any changes from the pre test to the post test should not be due to differences in the groups on these variables at least.

*Testing the hypotheses:*

*Hypothesis 1: Participants in the yoga program will have a lowered perception of their chronic pain after completion of the yoga sessions.*

*Hypothesis 2: Participants in the yoga program will have lowered perception of their life interference after completion of the yoga sessions.*

In order to examine the hypotheses, comparisons were made between pre and post test pain scores. Table 9 shows those means and standard deviations.

**Table 9**

Compared pain ratings pre and post yoga intervention

Variable	n	M	SD
<b>Worst pain</b>			
Pre	11	4.91	2.02
Post	11	3.18	1.66
<b>Least pain</b>			
Pre	11	2.18	1.72
Post	11	1.09	1.04
<b>Average pain</b>			
Pre	11	3.82	1.33
Post	11	2.91	1.14
<b>Current pain</b>			
Pre	11	2.80	2.10
Post	11	1.40	1.43

Pain rating means in worst, least, average and current pain ratings were all lower after the yoga intervention. The Wilcoxon Signed Ranks Test was used to compare differences.

**Table 10**  
Wilcoxon Signed Ranks Test of significant pain changes

Variable	n	Mean Rank	Sum	Z
Worst pain pre post				
Neg.	8	4.5	36	-2.6**
Pos.	0	0	0	
Ties	3			
Least pain pre post				
Neg.	5	4.0	20.0	-2.0*
Pos.	1	1.0	1.0	
Ties	5			
Average pain pre post				
Neg.	5	3.80	19.0	-1.8*
Pos.	1	2.0	2.0	
Ties	5			
Pain right now pre-post				
Neg.	6	4.5	27.0	-2.2*
Pos.	1	1.0	1.0	
Ties	3			

\*\*  $p < .01$

\*  $p < .05$

The Wilcoxon Signed Ranks Test indicated that there was a significant change from pre to post pain ratings at the  $p < .05$  level in worst, least, and current pain ratings. More negative changes indicated the pain levels decreased after the yoga intervention in all pain ratings.

**Table 11**

Compared interference ratings pre and post yoga intervention

Variable	n	M	SD
<b>Activity Interference</b>			
Pre	10	3.4	1.96
Post	10	2.1	2.56
<b>Mood interference</b>			
Pre	11	3.73	2.94
Post	11	2.73	2.94
<b>Walking interference</b>			
Pre	11	3.36	2.54
Post	11	2.27	2.10
<b>Normal work interference</b>			
Pre	11	3.64	2.01
Post	11	2.00	1.79
<b>Relationship interference</b>			
Pre	11	2.55	2.91
Post	11	2.09	3.18
<b>Sleep interference</b>			
Pre	11	3.18	2.89
Post	11	3.00	2.57
<b>Enjoyment of life interference</b>			
Pre	11	4.73	2.72
Post	11	3.00	2.72

Only matched pre and post surveys were used to obtain *n* of 10 and 11. All of the mean differences on all interference measures were lower on the post-yoga survey as compared to the pre-yoga survey. The Wilcoxon non-parametric test was used to compare differences.



**Table 12**

Wilcoxon Signed Ranks Test of interference ratings

Variable	n	Mean Rank	Sum	Z
<b>General activity interference</b>				
Neg.	8	4.75	38.0	-1.86
Pos.	1	7.00	7.00	
Ties	1			
<b>Mood interference</b>				
Neg.	5	4.80	24.00	-1.71
Pos.	2	2.00	4.00	
Ties	4			
<b>Walking ability interference</b>				
Neg.	5	4.80	24.00	-1.71
Pos.	2	2.00	4.00	
Ties	4			
<b>Normal work interference</b>				
Neg.	7	4.86	34.00	-2.25*
Pos.	1	2.00	2.00	
Ties	3			
<b>Relationship</b>				
Neg.	3	4.50	13.50	-.65
Pos.	3	2.50	7.50	
Ties	5			
<b>Sleep</b>				
Neg.	6	3.83	23.00	-.06
Pos.	3	7.33	22.00	
Ties	2			
<b>Enjoyment of life</b>				
Neg.	7	4.79	33.50	-2.20*
Pos.	1	2.50	2.50	
Ties	3			

\*  $p < .05$

The Wilcoxon Signed Ranks Test suggests that there were significant changes from pre to post ratings in some areas. General activity interference showed a lower mean pain rating after the yoga intervention, but not significantly so. Mood interference means lowered after the intervention, but was not significant. Walking ability interference means lowered after the intervention, but also was not significant. Normal work interference had a more negative direction (lowered pain ratings) after the intervention and this change was significant at  $p < .05$ . Relationship interference mean ratings decreased after the intervention, but not significantly. Sleep interference means decreased after the intervention, but this change was not significant. The enjoyment of life interference scale showed a lowered mean rating after the intervention and it was significant at  $p < .05$ . In summary, the two significant changes in lowered interference ratings were in normal work interference and enjoyment of life interference ratings.

The interference scores were created by combining all interference variables. The score range is 0-70.

**Table 13**

Compared interference scores pre and post yoga

Variable	n	M	SD
Interference score			
Pre-yoga	10	25	11.51
Post-yoga	10	16.7	13.43

This table shows that the interference scales did lower after the yoga intervention.

**Table 14**

Significance of compared scores pre and post yoga

Variable	n	Mean Rank	Sum	Z
Pre-post interference				
Neg.	9	5.33	48.0	-2.098*
Pos.	1	7.00	7.00	
Ties	0			

\*  $p < .05$

The Wilcoxon Signed Ranks Test shows a significant change between the pre-yoga interference ratings and the post-yoga interference scores at the  $p < .05$  level.

The survey also included qualitative questions regarding medications and treatments used by the participants. Prior to participating in the yoga exercises, 31% of the participants used other treatments such as acupuncture, chiropractic massage, other massage, stretches, aerobics and physical therapy to combat their chronic pain. After the yoga intervention, all but one of those participants were continuing with their alternative methods, but now three others participants claimed to be using yoga at least weekly. The amount of medications used before and after the yoga sessions did not seem to change according to the patients' self-report. No inferences can be made here, as the medication and treatment self-recording by participants was vague and often left not answered. It would be helpful to determine if any of these participants continued with yoga presently and if their medication or other treatment usage had decreased.

## CHAPTER V: DISCUSSION

The purpose of this study was to determine whether or not yoga exercises would be beneficial to patients suffering from chronic pain with the diagnosis of either fibromyalgia or osteoarthritis. A review of the literature shows an increasing use of complementary/alternative medicine for many chronic health problems. Because some of these alternatives are cost effective and more readily available for self-utilization, insurance companies are interested in empirical studies for the documentation of positive results. This HMO study was initiated in 2002 and the yoga sessions were completed in August of 2003.

Using a survey based on the Brief Pain Inventory, pain levels and pain interference levels were assessed using this self-report instrument before and again after the yoga sessions. For the patients who remained in the yoga program, the results show positive effects for yoga therapy. There are several limitations of this study that prevents an over-confident interpretation of the results, however.

### *Limitations*

Although the participant number is too small to make any robust assumptions or declarations, the entire process is an encouragement for further studies. Much of the program was done well, including the choice of participants by selecting the particular diagnoses, FMS and OA, and one intervention – yoga. It would be suggested that only one diagnosis with one specific complementary/alternative intervention be used in future studies, however, rarely a patient exists without co-morbidities.

It will also be necessary to increase participation in any similar program or study. The number of sessions must remain controlled, the time of day, the setting and the group

composition. Random selection would increase the statistical significance. This study did not involve random selection as all members who volunteered were selected to participate. Few men or minorities were among the volunteer which limits the results of this study primarily to white females. All of the participants were commercial members, which means Medicaid was not the payer.

The current study was conducted on two separate days at different times of the day. The Tuesday group was larger than the Friday group. These groups were too small for robust findings, but the ratings did not appear to differ between the groups of Friday vs. Tuesday participants.

The major limitations to this study were the absence of random assignment, a control group or a placebo group, and a larger number of participants. More emphasis on the recording of medications and other treatments would have made those variables comparable. These weaknesses make it impossible to rule out alternative hypotheses related to factors other than yoga, such as reactivity, and the placebo effect. Furthermore, even though those who dropped out were not significantly different than the participants who remained in the program, other non-measured differences may account for the changes seen.

### *Conclusions*

Previous research has found positive outcomes using yoga for patients with rheumatoid arthritis (Telles, 2001), migraines and osteoarthritis (Martin, 2001), stress/anxiety, headaches/migraines, back pain, respiratory problems, insomnia, cardiovascular and musculoskeletal problems (Long, 2001). Many adults are using alternative methods without the confidence of empirical research (Vallerand, et al, 2003).

Insurance companies are interested as well and will accept yoga if research can document its effectiveness (Lipson, 1999).

This limited program did find positive results from the yoga intervention for patients with chronic pain. The patients reported a lower pain rating when asked about their pain, and their worst, least and current pain ratings were significantly reduced after yoga. Ratings for normal work interference and enjoyment of life were also significantly decreased after the yoga sessions. An overall interference rating was computed and that also was significantly lower for members who completed the program.

### *Recommendations*

Further research on complementary/alternative medicine is necessary to determine its effectiveness for combating the devastating effects of chronic illness and pain. As it is difficult to determine which therapies work for which illnesses, it is necessary to attempt to compare them more individually in controlled, empirical studies. If complementary/alternative therapies can be found effective, it may be a benefit to patients, health care providers, and insurance companies in cost, long-term effectiveness, safety, and availability.

An additional study for this HMO would be beneficial. It would be necessary to increase the number of participants and have a more equal balance of males and females. A control group that receives no intervention could be compared as well as a group that receives the relaxation, breathing and posturing, without the yoga, for comparison. A random assignment to the different groups would increase the statistical validity. All sessions would be conducted in the same facility, at the same time of day, and with the same instructor to eliminate confounds. Participants could be pre-screened for mental

illnesses to avoid those confounds. Medications, clinic visits and motivation are other variables that could be examined for changes as the goal is to decrease the use of medications and doctors visits.



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## Appendix A

**GROUP HEALTH COOPERATIVE OF EAU CLAIRE  
AND  
YOGA CENTER OF EAU CLAIRE  
PILOT DISEASE MANAGEMENT PROGRAM**

Id# \_\_\_\_\_

Date of Birth: \_\_\_\_\_

Male/Female

Please do not write above this line.

DATE QUESTIONNAIRE COMPLETED: \_\_\_\_\_

- 1) Please rate your pain by circling the one number that best describes your pain at its **WORST** in the past 24 hours.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Pain as bad as you can imagine

- 2) Please rate your pain by circling the one number that best describes your pain at its **LEAST** in the past 24 hours.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Pain as bad as you can imagine

- 3) Please rate your pain by circling the one number that best describes your pain on the **AVERAGE**.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Pain as bad as you can imagine

- 4) Please rate your pain by circling the one number that tells how much pain you have **RIGHT NOW**.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Pain as bad as you can imagine







## Appendix B

### Brief Pain Inventory (Short Form)

Study ID# \_\_\_\_\_ Hospital # \_\_\_\_\_  
do not write above this line.

Date: \_\_\_\_\_

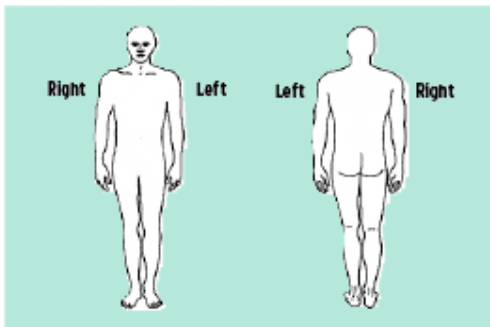
Time: \_\_\_\_\_

Name: \_\_\_\_\_  
Last First Middle Initial

1) Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today?

1. yes                      2. no

2) On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.



3) Please rate your pain by circling the one number that best describes your pain at its **WORST** in the past 24 hours.

0 1 2 3 4 5 6 7 8 9 10  
 No Pain Pain as bad as you can imagine

4) Please rate your pain by circling the one number that best describes your pain at its **LEAST** in the past 24 hours.

0 1 2 3 4 5 6 7 8 9 10  
 No Pain Pain as bad as you can imagine

5) Please rate your pain by circling the one number that best describes your pain on the **AVERAGE**.

0 1 2 3 4 5 6 7 8 9 10  
 No Pain Pain as bad as you can imagine

6) Please rate your pain by circling the one number that tell how much pain you have **RIGHT NOW**.

0 1 2 3 4 5 6 7 8 9 10  
 No Pain Pain as bad as you can imagine

7) What treatments or medications are you receiving for your pain?

\_\_\_\_\_

8) In the past 24 hours, how much **RELIEF** have pain treatments or medications provided? Please circle the one percentage that most shows how much relief you have received.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%  
 No Relief Complete Relief

9) Circle the one number that describes how, during the past 24 hours, **PAIN HAS INTERFERED** with your:

A. General Activity:

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

B. Mood

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

C. Walking Ability

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

D. Normal work (Includes both work outside the home and housework)

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

E. Relation with other people

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

F. Sleep

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

G. Enjoyment of life

0 1 2 3 4 5 6 7 8 9 10  
 Does not interfere Completely interferes

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