ACUPRESSURE AND ITS USE FOR DYSMENORRHEA

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Date

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I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosopy, with a major in Nursing.

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DEDICATION

This dissertation is dedicated to my parents, James R. and Vera R. Wood for the gifts they have bestowed upon me. My father's intelligence and wit will always be a source of inspiration to me as well as his optimistic view of life and affection for the human race. I would like to think that I have inherited my mother's strength of spirit, if so, this will take me anywhere I want to go.

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ACUPRESSURE AND ITS USE FOR DYSMENORRHEA

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ABSTRACT

The purpose of this study was to determine the effect of acupressure applied to the Ho-ku acupuncture point (on the hand between the index finger and thumb) on dysmenorrhea and attitudes toward menstruation. Sixty menstruating women were randomly assigned to a control group and an experimental group. The 33 item Menstrual Attitude Questionnaire (MAQ) was administered to all subjects upon admission to the study and at the completion of the study. Twelve women in the experimental group and twenty women in the control group completed the study.

Subjects in both groups were given diaries to record data related to their next three menstrual cycles. All subjects recorded analgesic use and pre-analgesic and post-analgesic pain ratings using the 0 to 5 Present Pain Intensity (PPI) Scale from the McGill Pain Questionnaire (MPQ). Subjects in the experimental group used the acupressure technique initially. Analgesics were taken only if a satisfactory level of comfort was not achieved. Repeated measures analysis of variance was used to analyze the monthly averages of pre-treatment and post-treatment pain scores of the subjects in both groups. Treatment consisted of analgesics in the control group and acupressure in the experimental group. A significant group difference (F = .039) and test difference (F = .001) were demonstrated. Repeated measures analysis of

variance of the pre-analgesic and post-analgesic pain scores of both groups demonstrated only a significant test difference ($E = .000$).

Analysis of covariance of the post-test MAQ scores of both groups was performed using the pre-test MAQ scores as a covariate. No significance was demonstrated when pre-test differences were controlled.

The conclusions of this study were: 1) there were significant differences in the two groups on both the pre-treatment and post-treatment pain ratings regardless of the month, 2) subjects in both groups experienced significant pain reduction whether they used analgesics or acupressure, 3) subjects in both groups experienced significant pain reduction after analgesic use, and 4) no change in menstrual attitudes was demonstrated as a result of participation in the study.

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CHAPTER ONE

INTRODUCTION

Freedom from pain is a basic human need. One form of pain prevalent in women of child-bearing age is dysmenorrhea, which is the occurrence of painful uterine cramps during menstruation. Dysmenorrhea is classified as either primary or secondary in origin. The pain associated with primary dysmenorrhea is thought to be due to a biochemical abnormality. Secondary dysmenorrhea exists when detectable pelvic lesions are present that account for menstrual pain. Primary dysmenorrhea is estimated to affect 50 per cent of post pubescent women (Dawood, 1988).

More than 50% of menstruating women experience dysmenorrhea with 10% suffering from incapacitating dysmenorrhea lasting 1-3 days each month (Ylikorkala & Dawood, 1978). Dysmenorrhea also has an economic impact. It is estimated that 600 million working hours are lost each year because of severe dysmenorrhea at a cost of 2 billion dollars annually (Dawood, 1988). About half of the women who experience dysmenorrhea require analgesic medications. Non-steroidal anti-inflammatory analgesics are the first choice in the medical management of dysmenorrhea (Helms, 1987).

Analgesics are probably the most frequently used method of controlling pain (Whipple, 1987). Medications are not the ideal solution to the problem of pain. Oral medications may not begin to take effect for thirty minutes after ingestion. Medications can also cause undesired systemic side effects (Rodman, Karch, Boyd, & Smith, 1985).

Less commonly used interventions for all types of pain include cutaneous stimulation, hypnosis, placebos, imagery, behavior modification, biofeedback, distraction and relaxation. Stress induced analgesia and vaginal stimulation-produced analgesia have shown to be useful in controlling pain in the laboratory setting but are not practical for use in the clinical setting at this time (Whipple, 1987). Pain control methods which have been used in practice by nurses with a degree of success are distraction, cutaneous stimulation, relaxation, and imagery. (McCaffery & Bebe, 1989). Some patients prefer not to use pain medications (Helms, 1987). Pain control methods, other than analgesics, clearly are needed. Acupressure, which is a type of cutaneous stimulation, used in pain control, will be the subject of this study.

Problem of Study

The problem of the study is: does acupressure decrease the pain of dysmenorrhea? The purpose of this study is to determine the effect of acupressure applied to the hand on a site between the thumb and index finger, on dysmenorrhea. The outcomes investigated are pain levels and menstrual attitudes.

Rationale for the Study

Acupressure consists of applying pressure and/or massage to traditional acupuncture points (McCaffery & Bebe, 1989). Acupuncture is a therapeutic technique which originated in China as early as 5,000 years ago (Steiner, 1983). In acupuncture, long, fine needles are inserted into particular sites in the skin in order to cure various disorders. These sites are called acupuncture points (Melzack & Wall, 1983). Acupuncture has been used to treat a variety of

gynecologic and obstetric problems such as amenorrhea, menorrhagia, dysmenorrhea, infertility, and problems of labor and delivery (Helms, 1987). Acupuncture points can also be stimulated by pressure, hence the term acupressure. Acupressure is a non-invasive procedure and the client can be taught to self-administer acupressure (Weaver, 1985). Acupressure costs nothing, is readily available, and has relatively low risk (McCaffery, 1979).

Dysmenorrhea is a prevalent problem affecting many menstruating women. Many women find it necessary to take medication and may lose time from normal activities due to dysmenorrhea. This study will examine an acupressure technique which is self-administered and could potentially decrease the amount of discomfort experienced with menstruation. The impact of dysmenorrhea on women's lives could be lessened if nurses could teach women to manage dysmenorrhea themselves without medication.

Theoretical Framework

Melzack and Wall proposed the Gate Control Theory of pain in 1965. The Gate Control Theory proposes that neural mechanisms in the substantia gelatinosa of the grey matter of the dorsal horns of the spinal cord act as a gate that can increase or decrease the flow of nerve impulses from peripheral nerve fibers to central transmission (T) cells, which project signals to the brain. Input through sensory nerve fibers is subjected to the modulating influence of the gate mechanism before it evokes pain perception and response. Input through larger diameter fibers such as A-beta fibers, which respond to light pressure, tend to close the gate mechanism, thereby decreasing the the ascension of pain impulses to the brain. Input through small diameter fibers

such as A-delta and C fibers, which respond to light pressure, heavy pressure, heat, and chemicals; tend to open the gate, facilitating the ascension of pain impulses. Chemicals which stimulate A-delta and C nerve fibers are potassium, adenosine triphosphate (ATP), histamine, and bradykinin. Prostaglandins sensitize nerve endings so they are more easily activated by other agents (Melzack & Wall, 1983).

Higher central nervous system processes such as attention, anxiety, anticipation, and past experience can have a great influence on the perception of pain through several systems. The first is via descending projection of the brainstem reticular formation. The descending inhibitory effect of the reticular formation on the gate mechanism is modulated by input to the reticular formation from somatic, visual, and auditory projections. Cognitive processes from the cerebral cortex also influence the ascension of pain impulses in two ways. Cortical fibers project into the reticular formation. Cognitive processes also influence the gate mechanism by pyramidal or cortico-spinal fibers which project into the dorsal horns of the spinal cord. (Melzack & Wall, 1983).

The output of the T cells ascends toward the brain by fibers in the anterolateral spinal cord to two major brain systems. The first is by way of neospinothalamic fibers into the ventrobasal, posterolateral thalamus, and the somatosensory cortex. Input through the neospinothalamic system contributes to the sensory-discriminative processing of pain impulses and a spatial-temporal analysis in the brain. The second major system of transmission of pain impulses to the brain is by way of medially coursing fibers into the reticular

formation, medial intralaminar thalamus, and the limbic system. Stimulation of the reticular and limbic structures affect a motivational-affective processing area of the brain producing strong aversive drive. The degree of activation of these two systems depends on the intensity of T cell activity which involves the number of active fibers and their rate of firing (Melzack & Wall, 1983). A higher central nervous system process, the central control process, evaluates the sensory input in terms of past experience, and exerts control over activity in both the discriminative and motivational systems. These three categories of activity in the brain interact with one another to form perceptions regarding the location, magnitude, and spatiotemporal properties of the noxious stimuli, motivational tendency toward escape or attack, and cognitive information based on an analysis of past experience and the probability of outcome of different response strategies. This process influences motor mechanisms that characterize overt responses to pain. Motor responses to pain include voluntary and involuntary motor activities (Melzack & Wall, 1983).

Cells in the periaqueductal grey and nucleus raphe magnus areas of the brainstem exert powerful inhibitory effects on the transmission of impulses from sensory fibers to T cells. Afferent stimulation evoked by injury and noxious levels of stimulation are affected primarily. The Gate Theory proposes that this inhibitory mechanism is mediated in the substantia gelatinosa (Melzack & Wall, 1983).

Melzack and Taenzer (1977) propose that an area in the brainstem which they call the "central biasing mechanism" receives input from all areas of the body and projects it to all levels of the spinal cord and brain. The cells of the

midbrain reticular formation have wide receptive fields. Electrical stimulation of points within the reticular formation has produced analgesia in discrete areas of the body (Melzack & Wall, 1984). This area is activated by input on small diameter nerve fibers. Electrical stimulation of this area has produced profound analgesia in large areas of the body. This can explain why intense stimulation at certain points of the body surface, called acupuncture points, results in significantly greater pain relief than the use of placebos (Melzack & Taenzer, 1977).

Endometrial concentrations of prostaglandins have been found to be elevated in dysmenorrheic women (Helms, 1987). Myometrial ischemia brought on by uterine contractions is thought to account for much of the pain of dysmenorrhea (Primary Spasmodic Dysmenorrhea, 1983).

Acupuncture therapy is theorized to stimulate endorphins. The level of endorphins, a group of endogenous opiate peptides, has been found to be elevated after acupuncture treatments. The analgesic effects of acupuncture have been reversed by the use of Narcan (naloxone), a narcotic antagonist (Anzhong, Xiaoping, Shaofen, Jieshi, & Wanying, 1980).

Assumptions

The assumptions underlying this investigation were:

1. Dysmenorrheic pain can be measured.
2. Menstrual attitude can be measured.
3. Women will truthfully record dysmenorrheic pain, use of acupressure, analgesic use, and resultant levels of dysmenorrheic pain.

Research Questions

The research questions investigated in this study were:

1. Is there a significant difference in pre-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment?

2. Is there a significant difference in post-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment?

3. Is there a significant difference in pre-treatment and post-treatment dysmenorrheic pain in women who receive analgesics?

4. Is there a significant difference in pre-treatment and post-treatment dysmenorrheic pain in women who receive acupressure?

5. Is there a significant difference in post-analgesic dysmenorrheic pain between women who receive acupressure treatment and women who receive only analgesic treatment?

6. Is there a significant difference between pre- and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ?

7. Is there a significant difference between pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ?

8. Is there a significant difference in number of times analgesics are used among women who use acupressure treatment first then analgesics as needed and women who receive analgesic treatment?

Hypotheses

The null hypotheses tested in this study were:

H_{1a}: There is no significant difference in pre-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment.

H_{1b}: There is no significant difference in post-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment.

H_2: There is no significant difference in pre-treatment and post-treatment dysmenorrheic pain in women who receive analgesics.

H_3: There is no significant difference in pre-treatment and post-treatment dysmenorrheic pain in women who receive acupressure.

H_4: There is no significant difference in post-analgesic dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment.

H_5: There is no significant difference between pre- and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ.

H_6: There is no significant difference between pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ.

H_7: There is no significant difference in the number of times analgesics are used between women who use acupressure treatment first then analgesics as needed and women who receive analgesic treatment.

Definition of Terms

Dysmenorrhea: The pain associated with menstruation. Primary dysmenorrhea is frequently described as being crampy and vise-like, involving the lower abdomen and sometimes radiating to the upper thighs. Pain is a personal sensation of hurt that occurs when stimulation of pain sensory fibers starts a pain impulse that is conducted through the gate mechanism in the dorsal horns of the spinal cord and through the central biasing mechanism in the brainstem to pain centers in the brain. An operational definition of dysmenorrhea will be a score on the Present Pain Intensity Scale of the McGill Pain Questionnaire (Melzack, 1975).

Acupressure: The pressure applied to an acupuncture point with the finger or thumb which activates small nerve fibers thereby stimulating the central biasing mechanism in the brainstem and blocking pain impulses from reaching the brain. Operationally, acupressure will consist of pressure applied to an area of the hand between the thumb and index finger. This site is known to acupuncturists as Ho-ku. Other sites are also indicated for relief of dysmenorrhea (Warren, 1976). This site was chosen by the researcher because a woman could apply pressure to this site in any situation during normal activities of daily living. It does not involve a part of the body normally covered by clothing that would require privacy to expose.

Menstrual attitude: An attitude is a way of acting or behaving that shows what one is thinking or feeling (Guralnik, 1967). Menstrual attitude would consist of actions or behaviors that show what one is thinking or feeling in

relation to the menstrual cycle. Operationally, menstrual attitude will be measured by the Menstrual Attitude Questionnaire (MAQ).

Analgesics: Analgesics are defined as pharmaceutical agents which relieve pain without producing loss of consciousness (Spencer, Nichols, Waterhouse, West, & Bankert, 1983). Operationally, the use of analgesics, self-reported by the subjects, will be quantified according to an analgesic equivalency table.

Limitations

The limitations of the study were:

1. All participants in this study were enrolled in college classes or college graduates. Results from the study cannot be generalized to others of differing educational levels.

2. The sample was composed of volunteers and not constructed by random assignment, limiting the generalizability to others who would volunteer in these settings.

3. Mortality was an acknowledged threat to the internal validity of this study due to the time involved (three menstrual cycles) and the amount of data the subjects were asked to record.

Delimitations

The study was limited in scope to the settings from which the sample is obtained. This study was performed on the campus of a southwestern elementary school, junior college, and university. This study involves dysmenorrheic pain in women of childbearing age. The findings of this study

may not be generalizable to other types of pain, persons of younger or older ages, and males.

Summary

This chapter described the prevalence of dysmenorrhea which can temporarily affect the productivity of women. Non-steroidal analgesics are currently the treatment of choice for dysmenorrhea. There are disadvantages to the use of non-steroidal analgesic use. Acupuncture, which consists of applying long, fine needles into the skin at acupuncture points has been used successfully to treat gynecological disorders such as dysmenorrhea. Acupressure stimulates these same acupuncture points with pressure. Acupressure is non-invasive, can be self-administered, and costs nothing. The Gate Control Theory of pain perception will be used in this study to determine if acupressure has any effect on dysmenorrhea. The next chapter details the literature supportive of this empirical endeavor.

CHAPTER TWO

REVIEW OF THE LITERATURE

The review of the literature pertinent to the present study is presented in this chapter. The areas which are the focus of this review are pain and pain management, acupuncture/ acupressure, dysmenorrhea, and relevant nursing research.

Pain and Pain Management

A review of the literature illustrates the evolution of concepts of pain, pain management, and dysmenorrhea. Pain theories may be grouped into four major categories; affect, specificity, pattern, and gate control. Each of these theories has made a significant contribution to the understanding of pain (Kim, 1980).

Affect Theory

The affect theory dates back to Aristotle, who considered pain to be an emotion that was the opposite of pleasure (Melzack, 1973). The affect theory does not systematically describe pain nor does it explain why pain is an emotion. The major contribution of the affect theory toward our understanding of the pain experience is that it addresses the emotional aspect of pain which is an important and frequently overlooked dimension of pain, (Kim, 1980).

Specificity Theory

The specificity theory of pain is attributed to Descartes in 1644 and was widely accepted until the end of the 19th century (Kim, 1980). Descartes theorized that a specific pain system existed that carried messages from pain receptors in the skin straight through to a pain center in the brain. At this

time pain was thought to be a purely a sensory experience. It was thought that noxious stimulation always produced pain. Pain had only one characteristic and varied only in intensity (Melzack & Wall, 1973). Descartes compared the pain system to a bell-ringing mechanism at a church. A man pulls the rope at the bottom of the tower and the bell rings in the belfry. Likewise, a flame sets particles in motion in the foot, the signal is transmitted up the leg, back and neck to the brain where an alarm system is set off. The individual then feels the pain and responds to it (Melzack & Wall, 1983). Muller proposed in 1842 that all somatic sensations are the function of a single sensory system. Muller agreed with Descartes' "straight through system" from the sensory organ to the brain (Melzack, 1983). Von Frey proposed that the four sensations of touch, warmth, cold, and pain, have specific and separate receptors that project impulses to the brain (Melzack & Wall, 1973). Von Frey also theorized that free nerve endings that branch out into the upper layers of the skin are pain receptors which make up the distal portion of a fixed direct-line communication between the skin and brain (Melzack, 1983). The major contribution of specificity theories toward the understanding of the pain experience is the identification of a physiological mechanism of receptors and skin sensory fibers with a highly specified function. The specificity theory does not take into account the psychological dimension of pain experience and response (Kim, 1980).

Pattern Theory

The "Pattern theory" of pain was proposed by Goldscheiden in 1894. Goldscheiden noticed long delays between the painful stimulus and the perception of pain, as well as persistent pain in pathological pain states

(Melzack & Wall, 1983). Goldscheiden theorized that "patterns" of nerve impulses that evoke pain are produced by the summation of the skin sensory input at the dorsal horn cells of the spinal cord (Melzack, 1973). The pattern theory can be used to explain delays, and temporal and spatial summation properties of pathological pain but does not adequately address the psychological dimension of pain (Kim, 1980).

Affective Theory

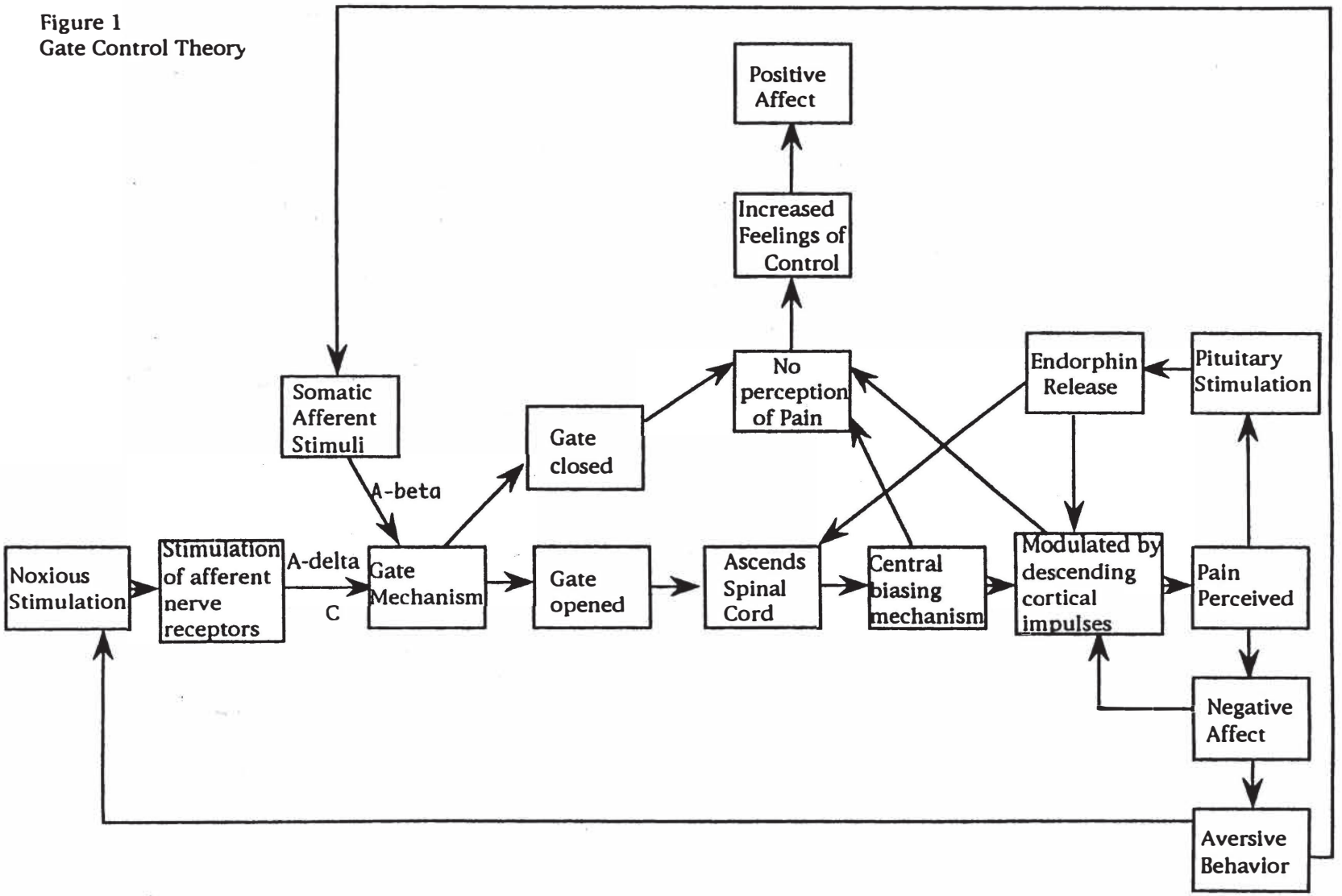
In 1900, Sherrington suggested that affective tone, as well as sensory mechanisms, is an attribute of all sensation including pain (Melzack, 1973). Sherrington proposed that "mind rarely, probably never, perceives any object with absolute indifference, that is without 'feeling' . . . affective tone is an attribute of all sensation, and among the attribute tones of skin sensation is skin pain" (Melzack & Wall, 1983).

Gate Control Theory

Melzack and Wall proposed the "Gate Control Theory" in 1965. The Gate Control Theory, using new experimental and observational evidence as well as contributions of previous pain theories, provides for a more comprehensive understanding of the pain phenomenon. The Gate Control Theory addresses both physical and psychological aspects of pain (Kim, 1980). A criticism of the Gate Control Theory is that it addresses the psychological dimension of pain in only a rudimentary form (Kim, 1980). A schematic diagram of the Gate Control Theory is seen in Figure 1, page 16. Noxious stimulation stimulates the A-delta and C pain fibers. Noxious stimulation can be mechanical, thermal, or chemical

in origin. The pain impulse is transmitted to the gate mechanism in the dorsal horns of the spinal cord. The A-delta fibers are myelinated and transmit impulses of sharp pricking pain rapidly. The C fibers are unmyelinated and thought to transmit impulses of deeper burning pain at a slower rate than the A-delta fibers. A pain experience may consist of both sensations, a sharp pricking pain followed be a deeper burning pain. Somatic afferent stimuli also enter at the gate mechanism via A-beta fibers which transmit nerve impulses stimulated by non-painful levels of heat, cold, and pressure. These A-beta fibers are thicker than the pain fibers. Stimulation of the thicker A-beta fibers are thought to "close the gate" or block the ascension of the impulses on the thinner A-delta and C fibers. If the gate mechanism is completely closed and the pain impulse is not allowed to ascend then no pain will be experienced. If stimulation on the A-beta fibers is not intense enough to "close the gate" then the pain impulse ascends the spinal cord. A proposed structure, the central biasing mechanism can block the ascension of pain impulses to the brain when activated by intense stimulation from remote body areas. If the central biasing mechanism fails to block ascending pain impulses, the pain impulses continue upwards toward the brain. In the brain the pain impulses are subject to descending cortical impulses from the cerebral cortex. Conditions such as inattention or feelings of control over the source of pain can block the ascension of the pain impulse toward the cerebral cortex. Anxiety or a past negative experience with the source of pain encourage the ascension of the pain impulse. If the pain impulse is not inhibited by descending cortical impulses, the pain impulse reaches the cerebral cortex and the individual

Figure 1
Gate Control Theory



perceives pain. The perception of pain leads to a negative affect and aversive behavior. The pituitary gland is stimulated and produces endorphins, a naturally occurring opiod, which occupies opiod receptor sites in the brain and spinal cord. The ascension of pain impulses to the cerebral cortex is inhibited when opiod receptor sites in the brain and spinal cord are occupied by opiods. Aversive behavior may lead to withdrawal from the source of pain which would decrease noxious stimulation. Aversive behavior may also lead the individual to apply massage, heat, or cold, to the painful area which would increase the stimulation of the A-beta fibers and close the gate, thereby decreasing the ascension of pain impulses. The negative affect produced by the perception of pain would increase the ascension of pain impulses toward the cerebral cortex. When the gate is closed no perception of pain is experienced. When pain is decreased the individual has an increased feeling of control over the source of pain leading to a positive affect.

Other Views of Pain

Sternbach (1968), described pain as an abstract concept with three components: a personal private sensation of hurt, a stimulus which signals potential or actual tissue damage, and a pattern of responses which protect the organism from harm.

McCaffery takes a humanistic view of pain. McCaffery's definition of pain is, "Pain is whatever the experiencing person says it is, existing whenever he says it does." The implications of this definition are that persons who say they are in pain are to be believed whether they truly are in pain or not. McCaffery feels that when this approach is taken some lies will be believed but the risk of a

person truly in pain being doubted is decreased. McCaffery identifies situational factors which influence a person's pain experience such as knowledge and understanding; level of consciousness; powerlessness; the meaning of the pain; presence, attitudes, and feelings of others; general physical environment; fatigue; stressful life events; and secondary gains. McCaffery believes that even if a person uses his pain to achieve secondary gain that does not mean the pain is nonexistent or of lesser intensity than he says it is (McCaffery, 1979).

Loeser (1983) has designed a four part pain model. Loeser states that pain consists of nociception, pain, suffering, and pain behavior. Nociception occurs when an A-delta fiber or C fiber is stimulated by a damaging or potentially damaging stimuli. Pain occurs when the nociceptive input is perceived as pain. An important aspect of the Loeser model is that nociception can occur without the presence of a tissue damaging event. Suffering is described as a negative affective response. Pain behaviors are output from the individual which are understood to be signifying a tissue damaging stimulus is in effect.

Menstrual Pain

Prostaglandins are thought to play a major role in menstrual pain. Increased prostaglandin F2 alpha production causes pain similar to dysmenorrhea (Shapiro, 1986). Prostaglandins are released by the endometrium near the time of menstruation. Prostaglandins increase smooth muscle contractions thereby increasing the contractility of the uterus. Prostaglandins also sensitize pain receptors which lowers the pain threshold (Khoiny, 1988). Menstrual prostaglandin release is significantly increased in primary

dysmenorrhea (Dawood, 1988). Prostaglandin levels are increased during the first 48 hours of menstruation which relates to a clinical finding of increased pain in the first two days of menstruation (Khoiny, 1988). Menstrual prostaglandins can be suppressed to normal levels when non-steroidal anti-inflammatory drugs (NSAIDs) are given. Relief of pain is associated with a significant decrease in menstrual prostaglandin level (Dawood, 1988). Prostaglandin inhibitors are capable of relieving menstrual pain. Cold temperatures have been found to aggravate the pain of menstruation by vasoconstriction of myometrial arterioles and increasing the release of prostaglandins (Khoiny, 1988). These findings support the theory of uterine ischemia as the cause of primary dysmenorrhea (Shapiro, 1986).

Pain Control

Hyperstimulation Analgesia

The use of painful stimuli or near painful levels of stimuli to fight pain is termed hyperstimulation analgesia. Fighting pain with pain has been a recurrent theme in pain management throughout history. The ancient Greeks and Romans used a method, cupping, in which heated glass cups are inverted and held over the painful area. As the air inside cooled and contracted, skin was sucked up into the cup. This procedure resulted in bruising (Melzack & Wall, 1983). Scarification is another ancient method of pain control in which the skin was cut with a sharp knife. Cauterization was another method of pain control used in ancient times. The end of an iron rod was heated until it was red hot and placed on a painful area (Melzack & Wall, 1983). These methods involved the use of brief moderate to intense pain to relieve a more severe chronic pain.

There are three major properties of hyperstimulation analgesia. The first is that moderate to intense stimuli applied to the body alleviates pain. This can be explained by brainstem mechanisms that exert a descending control over transmission through dorsal horns as well as in the somatic projection system (Melzack & Wall, 1983). The second major property of hyperstimulation analgesia is that sensory input is sometimes applied at a site distant to the painful area. The third major property of hyperstimulation analgesia is that sensory input of brief duration, a few seconds to thirty minutes, may relieve chronic pain for days, weeks, or even permanently (Melzack & Wall, 1983).

Traditional Chinese Medicine

Traditional Chinese medicine (officially called TCM) includes therapies such as acupuncture and herbology. The oldest major text, the Nei Ching or the Yellow Emperor's Classic of Internal Medicine dates from about 300 B.C. (Beal, 1992). Traditional Chinese medicine was outlawed in the 1920's by the Nationalist government of China because such practices were "backwards and superstitious" (Moyers, 1993, p. 252). The government efforts to end the practice of TCM were never successful because the majority of the Chinese people had faith in TCM. Another reason why the Chinese government could not obliterate TCM was that western-style medicine was not available to the majority of the population. TCM enjoyed renewed support from the government after the revolution of 1949. Mao Tse-Tung, then leader, called for more cooperation between Western-style and TCM physicians. "Chinese medicine and pharmacology are a great treasure-house and efforts should be made to explore them and raise them to a higher level," Mao is quoted as saying (Beal, 1992). At

this time a population of 500 million people were being served by only 38,000 Western-style medical doctors (Moyers, 1993). Western-style medicine became the choice of the elite but the masses remained ever loyal to TCM.

The Chinese government reports that there are now 2,100 TMC hospitals and approximately one million TCM trained doctors and pharmacists in China. Approximately one third of China's 1.1 billion people have been treated with acupuncture at least once in their lives. Acupuncture is also used in Japan, Korea, Singapore, Vietnam, and Malaysia (Moyers, 1993).

Many Americans became interested in the idea of acupuncture after a journalist, James Reston, wrote of his experiences relating to an appendectomy he underwent in China while covering President Richard Nixon's trip in 1971. Two articles appeared in the New York Times that summer in which Mr. Reston wrote of his own post-operative pain relief with acupuncture and moxibustion (stimulation of acupuncture sites with heat) as well as observations of surgeries performed with acupuncture anesthesia (Beal, 1992). Twenty years after Mr. Reston's writings, acupuncture is more accepted in Europe and Asia than in the United States, although acupuncture is available as an alternative medical treatment in many American communities (Beal, 1992).

Traditional Chinese medicine has always focused on prevention of disease. Disease is defined as "the struggle between human capability to resist disease and the pathogenic factors" (Moyers, 1993 p. 277). Chinese medicine focuses on the individual's capability to resist disease. The traditional task for the practitioner of TCM was to teach patients, by role modelling, to stay healthy through living correctly. Temperament, thoughts, diet, emotions, and exercise

all impacted health. The patient had the primary responsibility for sickness or health. The classical Chinese physician collected a fee only when the patient remained healthy. Payments stopped when the patient became ill (Moyers, 1993).

Central to Chinese medicine is Chi (pronounced chee), referred to as Qi in the Nei Ching, the life force energy. The Nei Ching describes this energy:

> The root of the way of life, of birth and change is Qi (energy); the myriad things of heaven and earth all obey this law. Thus Qi in the periphery envelopes heaven and earth, Qi in the interior activates them. The source wherefrom the sun, moon, and stars derive their light, the thunder, rain, wind and cloud their being, the four seasons and the myriad things their birth, growth, gathering and storing: all this is brought about by Qi. Man's possession of life is completely dependent upon this Qi. (Chang, 1976 p. 17).

All living things possess chi, even plants and animals (Moyers, 1993). The human body is endowed with a certain amount of chi at birth. Chi is depleted in the stresses of daily life but fortunately chi is simultaneously replaced through energy taken in in the form of food and air. Energy within the body is in a dynamic state of constant flux (Chang, 1976). In a healthy person, Chi, the life force, flows through the body in 12 right and left pairs of major meridians. The twelve major meridians are the lung, large intestine, stomach, spleen-pancreas, heart, Small intestine, bladder, kidney, heart constrictor (pericardium), triple heater (involving circulation and lymph), gall bladder, and liver. The structure and function of the meridians are completely different from that of the lymphatic, circulatory, and nervous systems (Chang, 1976). Each of the main meridians has a point of entry and exit. Energy enters the meridian at the point of entry, flows along the meridian, then exits at the exit point of another meridian. A secondary channel connects the energy flow out from one

meridian into the next. Each of the main meridians develops into secondary branches (Chang, 1976). There are a total of 365 meridians (Moyers, 1993). Some of the secondary branches supply energy to adjacent body areas while others ultimately reach the surface of the skin. The places where meridian branches reach the skin's surface are acupuncture points (Chang, 1976). The Nei Ching states this about meridians, "The means whereby man is created, the means whereby diseases occur, the means whereby man is cured, the means whereby disease arises: the twelve meridians are the basis for all theory and treatment" (Chang, 1976 p. 20). The Nei Ching also states, "The meridian is that which decides over life and death. Through it the hundred diseases may be treated" (Chang, 1976, p. 21).

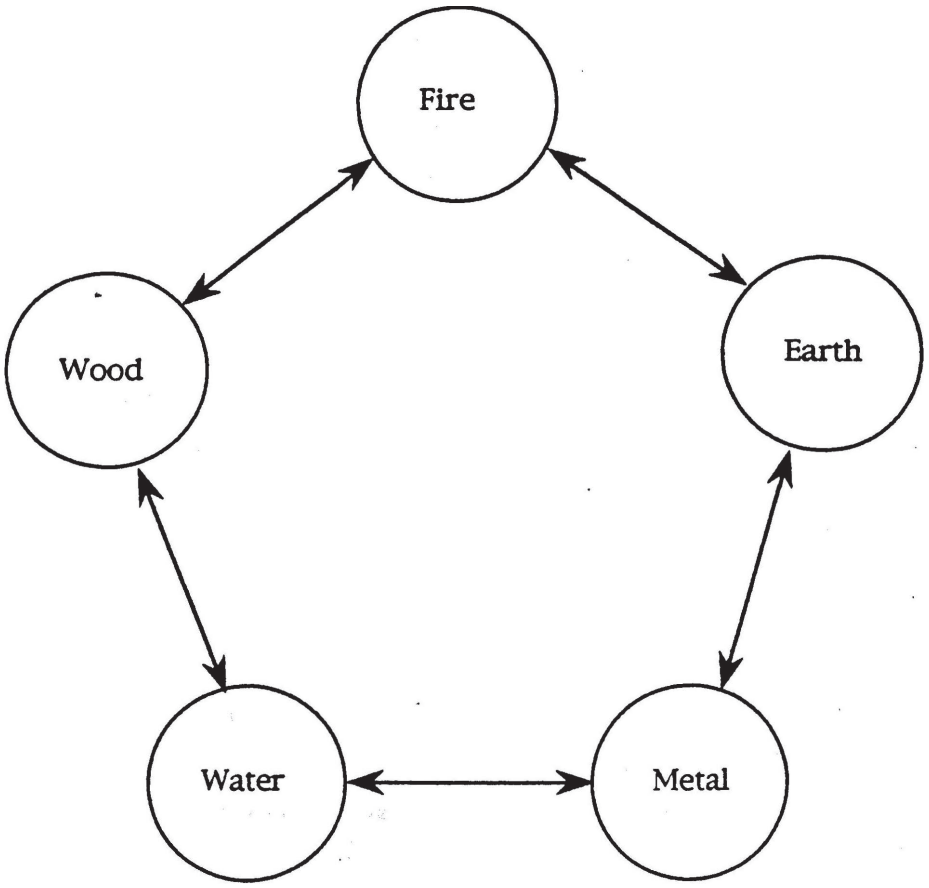
The cyclical flow of energy through the body via the meridians is an exact reflection of the interaction of energy in five earthly elements. An ancient Chinese saying is, "That which is above is the same as that which is below" (Chang, 1976, p. 54). Man is believed to be the microcosm of the macrocosm, the earth. The five earthly elements identified in TCM are fire, earth, metal, water, and wood. Two cycles exist in the exchange of energy within the five elements, one of generation and one of destruction. In the cycle of generation, each element generates the succeeding element. Fire produces earth, earth produces metal, metal produces water, water produces wood, wood produces fire and the cycle begins again. Each element destroys the succeeding element in the cycle of destruction. Fire destroys metal, metal destroys wood, wood absorbs water, water absorbs fire, and the cycle begins again (Chang, 1976). Each major meridian of the human body is identified with an earthly element. Fire is

identified with the heart, small intestine, triple heater, and heart constrictor meridians. Earth is identified with the spleen-pancreas and stomach meridians. Metal is identified with the lung and large intestine meridians. Water is identified with the kidneys and bladder meridians. Wood is identified with the liver and gall bladder meridians (Chang, 1976). Traditional Chinese medicine sorts the meridians into two categories, organ and bowel. The meridians in the organ category relate to a solid structure. The liver, heart, spleen, lung, kidney, and heart constrictor meridians are classified as organ meridians. The meridians in the bowel category relate to hollow structures. The gall bladder, small intestine, stomach, large intestine, bladder, and triple heater meridians belong to the bowel category (Chang, 1976).

A "mother-child law" relates to the exchange of energy within the five elements and also in the human body. Each element is the "mother" of the succeeding element and the child of the preceding element (see Figure 2, page 25). Earth is the mother of metal and the child of fire. If the energy in an organ is unbalanced, the succeeding organ on the meridian circuit will be adversely affected. For example, an imbalance of the heart meridian (fire) will adversely affect the lungs (metal). An organ may be adversely affected by an imbalance in an organ preceding it on the meridian cycle (Chang, 1976).

The flow of Chi, through the meridians, protects and nourishes body tissues. If the flow of Chi is interrupted or stagnated disease states occur (Steiner, 1983). Energy may be overabundant or bound up in one or more meridians or at a point of the meridian. Energy may be deficient in other points

Figure 2
The five elements and their cycles of interaction



or meridians (Beal, 1992). Treatment at specific acupuncture sites restore the circulation of Chi and restore health (Steiner, 1983). Traditional Chinese medical treatment can consist of acupuncture, acupressure, or moxibustion. Acupuncture is the insertion of thin needles into acupuncture points on the body to stimulate or disperse energy (Chang, 1976). Acupressure is the stimulation of these points with pressure, usually with the thumbs or palms (Chang, 1976). Moxibustion is the stimulation of acupuncture sites with heat. An herb called moxa is placed on the chosen site of the skin and ignited. it is allowed to burn all the way to the skin. This process is frequently painful and produces a blister although some describe it as a pleasant sensation. A thin slice of ginger is often placed between the skin and the moxa to reduce the pain and severity of the blister (Chang, 1976).

Yin and Yang represent complementary antagonists that characterize the nature of life. Yin is quiet, dark, and cool, while Yang is active, bright, or hot. Each meridian has primary Yin and Yang functions and attributes.

Acupuncture

Acupuncture points have been found to correspond to known neuroanatomic structures. A study of seventy acupuncture points demonstrated that the points can be classified into three groups. Acupuncture points in group one correspond to the motor point of a muscle. A motor point is the region of skin where an innervated muscle is most sensitive to percutaneous electrical stimulation at the lowest intensity. Acupuncture points in group two lie over areas where superficial nerves from both sides of the body meet. Acupuncture

points in group three lie over nerve plexuses or superficial cutaneous nerves (Gunn, Ditchburn, King, and Renwick, 1976).

Ho Ku (pronounced ho koo) is the acupuncture point used in this study (see figure 2, page 23). Ho Ku corresponds to superficial branches of the radial nerve and deep palmar muscle branches or the ulnar nerve. These two structures are complexes of cervico-spinal nerves that travel up the arm to join with the autonomic nervous system and spinal cord in the neck (Kurland, 1977).

Acupuncture has been used successfully in the management of dysmenorrhea. In a study of forty-three women, 90.9% of the real acupuncture (as opposed to the placebo acupuncture) group showed improvement in pain scores with a 41% reduction in analgesic use. (Helms, 1987). The real acupuncture group received acupuncture therapy at known acupuncture sites. The placebo acupuncture group received acupuncture therapy at sites other than traditional acupuncture sites. Zhang (1984) also reports 49 cases of dysmenorrhea treated with acupuncture. Another study of forty-eight dysmenorrheic women reports an 80% success rate in treating dysmenorrhea with acupuncture (Steinberger, 1981).

Transcutaneous Electrical Nerve Stimulation (TENS)

Transcutaneous electrical nerve stimulation (TENS) on acupuncture points led to a reduction in abdominal pain immediately after treatment in women with primary dysmenorrhea (Santiesteban, Burnham, George, Kita, Mehring, 1985). Another study of the use of TENS for dysmenorrhea found a significant difference in decrease in pain and duration of pain relief with the use of

conventional TENS as compared to the control group (Mannheimer & Whalen, 1985).

Ultrasound Therapy

Ultrasound stimulus applied to acupuncture meridian system has been found to be safe and effective in the treatment of dysmenorrhea. Ultrasound therapy was found to have greater acceptance by patients than traditional acupuncture. Ultrasound also treated a wider surface area (Rossman, Wexler, & Oyle, 1974).

Acupressure

Acupressure makes use of the same points and meridians that are used in acupuncture. No needles are used. Pressure is applied to the acupuncture points with the thumb and forefinger. The effect is the same (Beggs, 1980).

Acupressure is derived from acupuncture. Instead of using needles thumbnails or fingernails are used. Pressing with the pads of the fingertips will not produce the desired nerve stimulation. The thumbnails should be short and rounded. When acupressure is properly applied there is no bruising, puncturing or injury to the skin (Kurland, 1981).

The thumb should be bent to apply the pressure. The area must be pressed hard enough to cause brief pain. Tenderness at the pressure site is a sign that the desired area has been precisely located. Insufficient pressure will not produce the desired response (Kurland, 1981). Pressure should be maintained for 30 seconds. If this becomes too difficult the pressure can be alternately applied and released for a thirty second period of time (Kurland, 1981). It is impossible for one to "overdose" one's self with acupressure. If an initial

application of pressure is ineffective repeat applications can be safely used. When the effect of one application of acupressure begins to "wear off" another application of acupressure can be given in complete safety (Kurland, 1981).

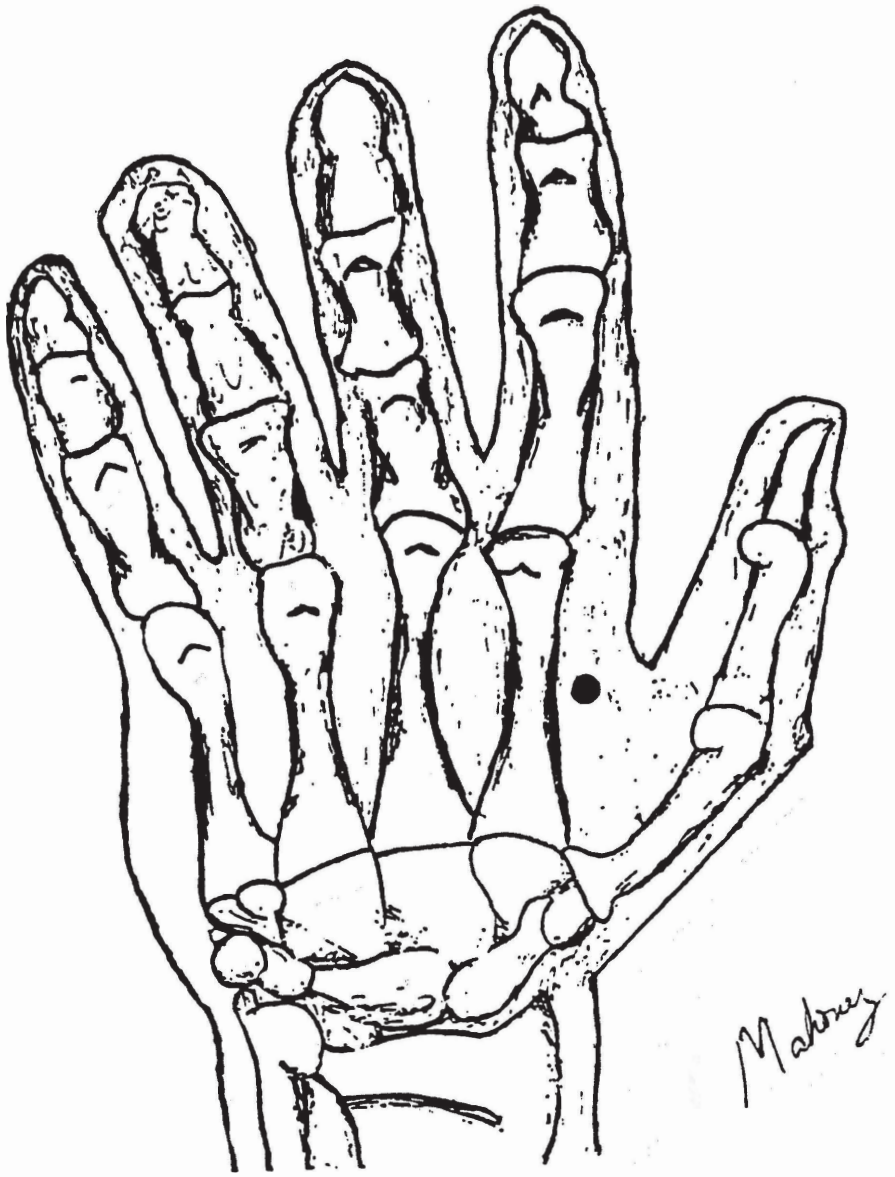
The Ho-Ku point is located between the thumb and index finger on the back of the hand near the middle of the second metacarpal bone that runs from the knuckle of the index finger to the wrist. It is on the thumb side of the bone and closer to the index finger than to the thumb. When the thumb and index finger are held together the Ho Ku point is on top of the highest spot in the web of flesh on the back of the hand (Kurland, 1977). To reach this spot spread one hand out so that the web of the thumb is stretched. Straighten the opposite thumb and bring it pointing upward to the middle of the stretched web. The web should line up with the first joint of the straightened thumb. The web runs along the fold of skin just below the ball of the thumb where the tip of the thumb bends. Bend the thumb over toward the web on the back of the opposite hand until the tip of the thumb touches the fleshy web. Push downward and inward with your thumbnail as though trying to push beneath the muscle. Move the thumbnail back and forth along the web, a fraction of an inch at a time. When a tender spot has been hit Ho Ku has been found (Kurland, 1977).

The thumb must be bent so that the two joints form a right angle. Press hard enough to make the point hurt in order to temporarily overload a nerve pathway with impulses otherwise the results will be unsatisfactory. Press each point for fifteen to thirty seconds. Steady pressure may work or alternating pressure if pain is unusually severe or pressure point is very tender. Pressing steadily for fifteen seconds may be too much of a demand on the thumb and

hand muscles. The tendency is to press forcefully in the beginning then slacken off without realizing it (Kurland, 1977).

Press both points of a given pair. One side is pressed after the other. Good leverage is important. Put the fingers of the hand under the hand being pressed. There is inconclusive evidence that pressing these pressure points might lead to miscarriage or complications of pregnancy (Kurland, 1977).

Figure 3 Ho-ku Acupressure Point (Kurland, 1977)



Acupressure can be applied whenever and wherever the person happens to be. It can be done in public in a way that no one else will think unusual (Kurland, 1977).

Kurland suggests several reasons that acupressure may be ineffective for pain control. The correct acupressure point may have been missed. Inadequate pressure may have been applied to the acupressure point. Pressure may not have been held for at least fifteen to thirty seconds. Repeat treatments may have been avoided. The individual may panic when acupressure fails to provide 100% relief. The use of medication for pain may be a conditioned response, in other words, the individual may feel that if medication is not taken he or she will experience pain. The individual may have experienced a change in medical condition. Psychological stresses may aggravate the pain. The individual may be experiencing secondary gains from the pain (Kurland, 1977).

Dysmenorrhea

Dysmenorrhea has been recorded from early history. Hippocrates proposed that the cause of painful menstruation was cervical obstruction which led to stagnation of menstrual blood. Hippocrates recommended that the external genitalia of the dysmenorrheic woman be exposed to vapors of a decoction of sweet wine, fennel seed, fennel root, and rose oil (Henzl, Massey, Hanson, Buttram, Rosenwaks, & Pauls, 1980).

Many cultures, such as orthodox Jews had taboos related to menstruation. Menstruating women were separated from others and had to undergo cleansing rituals after the menstrual flow had ceased (Lennane, 1980).

During the Victorian era menstruation was treated as an illness. In order to prevent or treat painful menstruation the menstruating woman was expected to rest in seclusion with a minimum of activity (Kinch, 1985). Bathing had to be avoided until after the menstrual flow had ceased (Lennane, 1980). As late as 1935, women were advised to refrain from an excess of needlework or piano playing and not sing at all during their menstrual periods (Lennane, 1980).

Dr. Robert Batty of Rome, Georgia performed bilateral oophorectomies on women with healthy ovaries in order to treat dysmenorrhea in 1865 (Kinch, 1985). By 1906, it was estimated that 150,000 relatively young women had undergone bilateral extirpation of healthy ovaries (Henzl, Massey, Hanson, Buttram, Rosenwaks, and Pauls, 1980). An ancient belief that a "sympathy" exists between the breasts and uterus led physicians to apply cupping glasses to the breasts of women suffering from dysmenorrhea. In 1907, Dr. Oscar Polano claimed success in treating dysmenorrhea with the application of suction cups to the breasts of women with menstrual pain (Henzl, Massey, Hanson, Buttram, Rosenwaks, and Pauls, 1980).

Today menstruation is thought of as a normal function. One reason might be that women are now thought of as productive and equal members of society rather than as semi-invalids (Lennane, 1980).

During the 1960's the prevailing attitude was that dysmenorrhea was psychogenic in origin (Kinch, 1985). Medical textbooks reported dysmenorrhea was related to the woman's conflicting feelings about sexuality and childbearing. On some occasions, dysmenorrhea was thought to arise from a woman's deep dislike or rejection of the feminine role in life (Lennane, 1980).

The major change in the medical community's attitude toward dysmenorrhea was due to the discovery of a scientific pathological explanation for dysmenorrhea (Kinch, 1985). Dr. Schick, an obstetrician, discovered "menotoxin" a substance he postulated was associated with dysmenorrhea. Menotoxin was, in all probability, prostaglandin. Dr. Schick received a gift of roses which were placed in water by a servant woman. The next morning he awoke to find the roses withered. The servant was not surprised since she was menstruating when she placed the flowers in the water. Dr. Schick repeated these experiments with this servant woman and various cut flowers over the next several months. He was satisfied that for this woman menotoxin circulated in the blood during menstruation and also was excreted in sweat and menstrual fluid (Kinch, 1985).

Pickles (1979) found that an aqueous dilution of the milk of a menstruating subject was toxic to cut blooms of the polyanthus. He also noted that a breast fed baby was likely to suffer gastrointestinal disturbances during the mother's menstrual cycle. Pickles (1979) proposed that the menstruating uterus produces a substance which acts locally or systemically to stimulate uterine expulsive movements. Von Euler proposed that prostaglandin F-2alpha, found in the menstruating endometrium was responsible for the locus of action (Kinch, 1985). Objective criteria such as measurement of menstrual or endometrial prostaglandin levels in the assessment of the response to different therapies for dysmenorrhea have increased the medical community's ability to objectively validate the occurrence of dysmenorrhea (Dawood 1985b).

Primary dysmenorrhea

It is thought that primary dysmenorrhea begins with the first ovulatory cycles, usually within six to twelve months following menarche since the first few menstrual cycles following menarche are thought to be anovulatory. (Lundstrom, 1985). Women who are anovulatory usually do not experience menstrual pain (Rosenwaks & Seegar-Jones, 1980). The typical patient with primary dysmenorrhea experiences severe lower abdominal cramps beginning just before or at the onset of menstrual flow. The severity of the cramps are directly proportional to the volume of menstrual blood flow. The pain is more intense with the passage of clots. The cramps are located in the suprapubic region bilaterally and tend to radiate down the front of the thighs. The cramping lasts six to twenty-four hours and subsides spontaneously. Often the woman with dysmenorrhea also experiences nausea; which may be accompanied by vomiting; irritability, and sometimes diarrhea (Kinch, 1985). Urinary frequency, headache, and emotional changes have also been associated with primary dysmenorrhea (Khoiny, 1988). Marked vasoconstriction accompanies the acute phase of primary dysmenorrhea, so much so that the dysmenorrheic woman may resemble a patient in shock (Kinch, 1985). The symptoms associated with dysmenorrhea closely resemble the side effects of prostaglandin, which are nausea, vomiting, diarrhea, vasoconstriction, and severe uterine cramps (Kinch, 1985). Diarrhea, vomiting, headache, and syncope can be induced by the intravenous injection of prostaglandins (Rosenwaks & Seegar-Jones, 1980).

There is a tendency for primary dysmenorrhea pain to decrease as a woman grows older and may disappear after childbirth (DeBrovner, 1985).

The exact physiologic explanation for the relief some women report from primary dysmenorrhea following a full term delivery is unclear. One explanation is that the adrenergic sensory nerves along the cervix become damaged after maximal cervical dilatation. The increase in vascular supply to the uterus during pregnancy may decrease the development of painful ischemia during subsequent menstrual cycles. Many women experience short term but not permanent relief in dysmenorrhea following delivery (Lundstrom, 1985).

Delivery of progesterone to the endometrium has been found to significantly lower menstrual blood loss and prostaglandin F2 alpha content in menstrual fluid. The researchers feel intrauterine progesterone decreased prostaglandin F2 alpha levels either by influencing the endometrial ability to synthesize prostaglandin F2 alpha or by reducing the endometrial mass thereby reducing the source of prostaglandin F2 alpha synthesis (Trobough, Guderian, Erikson, Tillson, Leong, Swisher, & Pharriss, 1978).

Factors which contribute to the quantity of pain perceived by dysmenorrheic women involve three aspects: the ascending pathway from the pelvis, where the pathophysiology is occurring; the efferent pathway, which is what the patient physically experiences as pain; and extraneous factors that act on the brain, such as stress, the effect of previous experiences with dysmenorrhea, previous emotional experiences, and other emotional and cultural factors (Dawood, 1985).

Primary dysmenorrhea rarely begins more than a year after menarche (Dawood, 1985). The duration of primary dysmenorrhea is usually 48-72 hours. Primary dysmenorrheic pain can begin a few hours before the onset of

menstrual flow, at the time menstrual flow begins, or shortly after menstrual flow begins (Dawood, 1985). Pain that begins more than twenty-four hours before the onset of menstrual flow is more likely to be caused by secondary dysmenorrhea (Dawood, 1985).

Primary dysmenorrhea usually begins a few hours before menstrual flow begins or with the onset of flow. Primary dysmenorrhea may last for a few hours up to two days (Rosenwaks & Seegar-Jones). The character of dysmenorrheic pain has been described as crampy, spasmodic, wringing, and labor-like. Less frequently the pain has been described as a dull ache or stabbing sensation (Dawood, 1985). Dysmenorrheic pain is reported occurring in the lower midabdominal region and may radiate to the back and/or upper thighs (Rosenwaks & Seegar-Jones, 1980). A woman may also experience pain with the passage of clots as the uterus contracts to expel clots through the cervix (DeBrovner, 1985).

Etiology

The painful uterine contractions of primary dysmenorrhea occur when prostaglandin F2-alpha increase the influx of calcium across the myometrial cell membrane. Prostaglandin F2-alpha also inhibits andenylate cyclase which reduces the calcium binding to cytoplasmic proteins. Magnesium counteracts calcium by producing myometrial relaxation through depletion of ATP. Magnesium deficiency has been suggested as a factor in dysmenorrhea (Lundstrom, 1985). The pain of dysmenorrhea is thought to be caused by ischemia brought about by the extremely high basal tone of the myometrium which interferes with uterine circulation. Dysmenorrhea has been called

"uterine angina" (Dingfelder, 1981). Bradykinin is produced in ischemic tissues and may contribute to the overall sensation of pain (Lundstrom, 1985). Dysmenorrheic pain is rapidly decreased by the administration of calcium antagonists and prostaglandin synthetase inhibitors. These findings give support to the correlation between hypercontractility and dysmenorrheic pain (Lundstrom, 1985). The relief of dysmenorrheic pain by prostaglandin synthetase inhibitors is accompanied by decreased serum and menstrual fluid prostaglandin levels and a decrease in intrauterine pressure (Rosenwaks & Seegar-Jones, 1980).

Treatment

Mild dysmenorrhea frequently can be relieved by rest, over-the-counter analgesics, and the local application of heat. Moderate and severe dysmenorrhea frequently are treated with medication (Khoiny, 1988).

Oral contraceptives and prostaglandin synthetase inhibitors or non-steroidal anti-inflammatory agents (NSAIDs) are the two most commonly used medications for primary dysmenorrhea (DeBrovner, 1985). If the woman with primary dysmenorrhea wishes to have birth control, oral contraceptives offer both birth control and relief from primary dysmenorrhea. Women with primary dysmenorrhea who take oral contraceptives experience a reduction in menstrual fluid prostaglandin levels to a level below that of non-dysmenorrheic women (Dawood, 1985). Contraindications to the use of oral contraceptives are thromboembolic disorders, cardiovascular disorders, known pregnancy, known or suspected estrogen-dependent neoplasia, benign or malignant liver tumor, and impaired liver function. Serious relative contraindications to oral

contraceptive therapy are depression, migraine or vascular headaches, hypertension, diabetes, sickle cell disease, long leg cast or major surgery or injury to lower leg, or major surgery requiring immobilization (Khoiny, 1988).

Non-steroidal anti-inflammatory agents relieve dysmenorrhea by blocking the uterine synthesis of prostaglandin. Uterine contractility is reduced (Tolman, McGuire, & Rosenthale (1985). The reduction in uterine contractility results in increased uterine blood flow and a decrease in ischemic pain (Lundstrom, 1985). Dingfelder (1981) reports, in an overview of the literature on the treatment of primary dysmenorrhea with prostaglandin inhibitors, results of several studies documenting the efficacy of NSAIDs in the treatment of dysmenorrhea.

Four non-steroidal anti-inflammatory agents (NSAIDs) have been approved by the United States Food and Drug Administration (FDA) for use in dysmenorrhea. They are ibuprofen, mefenamic acid, naproxen, and naproxen sodium. Ibuprofen is marketed with the trade names Advil, Motrin, Nuprin, and Rufen. The recommended dosage for dysmenorrhea is 400 mg. every 6 hours (Khoiny, 1988). Ibuprofen is reported to have lead to pain relief in 56 to 100% of dysmenorrheic women (Tolman, McGuire, & Rosenthale (1985). Mefenamic acid is also sold as Ponstel. The recommended dosage is 400 mg. for an initial dose, then 250 mg. every 6 hours (Khoiny, 1988). The use of mefenamic acid is credited with pain relief in 59 to 95% of dysmenorrheic women (Tolman, McGuire, & Rosenthale (1985). Naprosyn is a brand name for naproxen. The recommended dosage is 500 mg. for an initial dose, then 250 mg. every 6-8 hours (Khoiny, 1988). Tolman, McGuire, & Rosenthale report the use of naproxen lead

to pain relief in 61 to 90% of dysmenorrheic women (1985). Anaprox is the trade name for naproxen sodium. The recommended dosage is 550 mg. for an initial dose, then 275 mg. every 6-8 hours (Khoiny, 1988). Henzl, Massey, Hanson, Buttram, Rosenwaks, and Pauls report significant ($p < 0.05$) relief from menstrual pain with naproxen sodium as opposed to a placebo (1980).

Aspirin, a classic NSAID, has shown to be effective only in the presence of mild dysmenorrhea. Aspirin has shown to be of little value in the relief of moderate and severe dysmenorrhea (Khoiny, 1988). Tolman, McGuire, & Rosenthale report aspirin had little to no significant effect on dysmenorrhea (1985). Piroxicam (Feldene) shows promise in its effectiveness against dysmenorrhea (Khoiny, 1988). An advantage of piroxicam is its extremely long half-life. Piroxicam is effective in a once-daily dose (Amadio & Cummings, 1986). Approximately three-fourths of women who use NSAID therapy experience complete or significant relief from dysmenorrhea (Amadio & Cummings, 1986).

Adverse effects related to the use of NSAIDs are epigastric pain, nausea, vomiting, alteration of platelet function, prolonged bleeding time, headache, dizziness, blurred vision, and tinnitus. Women who use NSAIDs only for a few days a month for dysmenorrhea would not be at great risk of experiencing these side effects (Khoiny, 1988). Non-steroidal anti-inflammatory agents should be used with caution by anyone with compromised renal status (Henrich, 1983).

Secondary dysmenorrhea

Causes of secondary dysmenorrhea are endometriosis, intrauterine device, pelvic inflammation and infection, adenomyosis, uterine polyps, uterine

myomas, uterine adhesions, bicornate and separate uterus, transverse vaginal septum, cervical strictures or stenosis, ovarian cysts, pelvic congestion syndrome, and Allen-Master's syndrome (Dawood, 1985). Fibroid uterus, abdomiopelvic adhesions, and musculoskeletal pain are other identified conditions leading to secondary dysmenorrhea (DeBrovner, 1985).

Endometriosis is the implantation of endometrial cells outside of the endometrium of the uterus. Frequent implantation sites of endometriosis include the ovary, sigmoid serosa, uterosacral ligaments, the outside of the uterus, the cul-de-sac, bladder, recto-vaginal areas, and other areas in the peritoneal cavity (DeBrovner, 1985). The pain associated with endometriosis is described as a more constant achy type of pain than the pain associated with primary dysmenorrhea. The pain is more likely to occur before the flow of menses and persist after flow has ceased. Dyspareunia and infertility are other symptoms associated with endometriosis. Dyspareunia has never been associated with primary dysmenorrhea. The presence of dyspareunia along with dysmenorrhea suggests an organic cause of dysmenorrhea (DeBrovner, 1985).

Pelvic inflammatory disease (PID) should be suspected as a cause of dysmenorrhea if the woman reports a history of pelvic pain, fever, and vaginal discharge. The presence of an intrauterine device is also associated with pelvic inflammatory disease. The pain related to PID can be sudden or insidious in onset (DeBrovner, 1985).

The presence of an ovarian cyst can lead to unilateral intermenstrual pain. Pain on the affected side can also occur during intercourse (DeBrovner, 1985).

A fibroid uterus can cause pain during menstruation due to an increase in the passage of clots during menstruation (DeBrovner, 1985).

Adenomyosis is a condition where the endometrium has grown into the myometrium. Endometrial cells "menstruate" into the fibers of the uterine muscle during menstruation. The uterine contractility is impaired and menstrual fluid loss becomes heavy. The pain symptoms associated with adenomyosis are similar to those of endometriosis (DeBrovner, 1985).

Abdominopelvic lesions should be considered as a contributor to menstrual pain when there is a history of appendicitis, diverticulitis, or any abdominal or pelvic surgery. Previous surgical procedures on gastrointestinal, urologic, or reproductive structures have been associated with increasing menstrual pain. Abdominopelvic adhesions from inflammation or surgery become more painful with the pelvic congestion surrounding menstruation (DeBrovner, 1985).

Musculoskeletal pain can contribute to menstrual pain as well. Fluid retention during the premenstrual phase of the menstrual cycle can cause lumbosacral nerves and other tissues to swell. Any narrowing of the intervertebral space increases the compression on the nerve which can lead to back pain sometimes with sciatic radiation. Back pain during menstruation may also be attributable to a retroverted uterine position (DeBrovner, 1985).

A history of dysmenorrhea beginning at menarche or after the age of 25 merits an investigation to rule out secondary dysmenorrhea (Rosenwaks & Seegar-Jones, 1980). Secondary dysmenorrhea may begin a few days prior to menstrual flow or at other phases of the menstrual cycle (Rosenwaks & Seegar-Jones, 1980).

Idiopathic Dysmenorrhea

Primary dysmenorrhea which does not respond to prostaglandin synthetase inhibitors may be termed idiopathic dysmenorrhea. Idiopathic dysmenorrhea is a term reserved for the condition existing when dysmenorrhea fails to respond to prostaglandin synthetase inhibitors yet no organic cause for dysmenorrhea is evident (Rosenwaks & Seegar-Jones, 1980).

Premenstrual Syndrome

Irritability, depression, headaches, and inability to concentrate are symptoms described as characteristic of premenstrual syndrome. Prostaglandin synthetase inhibitors have no effect on premenstrual symptoms. Premenstrual syndrome appears to be etiologically unrelated to primary dysmenorrhea (Rosenwaks & Seegar-Jones, 1980).

Dysmenorrhea Research

A great deal of data was collected regarding dysmenorrhea in an epidemiologic study performed in Gothenburg, Sweden (Andersch & Milsom, 1982). The findings suggest a wide prevalence and severity of dysmenorrhea in young women (Andersch & Milsom, 1982). In this study of 596 nineteen year old women, 72.4% admitted to experiencing dysmenorrhea. A total of 50.9% of the respondents in this study reported missing time from work or school due to dysmenorrhea. The researchers found 38.2% regularly used analgesics and/or antispasmodics during menstruation for dysmenorrhea. Seventy-one of the eight-nine contraceptive users also regularly used analgesics and/or antispasmodics for dysmenorrhea. Ninety (15.4%) of the subjects reported a level of dysmenorrhea which limited daily activity and was unimproved by

analgesics. Twenty-two percent of the subjects suffering from dysmenorrhea had consulted a doctor because of dysmenorrhea. Another 23,9% reported they desired medical attention for dysmenorrhea (Andersch & Milsom, 1982).

All significance tests for correlation in this study were performed with Pitman's permutation test. Pitman's permutation test is a nonparametric trend test applicable to discrete as well as continuous distributions. The severity of dysmenorrhea was measured by the linear analogue scale and compared to the severity of dysmenorrhea as measured by the verbal multidimensional scoring system. A significant correlation ($p \leq 0.01$), using Pitman's permutation test, was found between the assessment of dysmenorrhea severity by the two methods. A significant difference ($p \leq 0.01$), using Pitman's permutation test, in the prevalence and severity of dysmenorrhea was noted between oral contraceptive users as compared to IUD users and women using neither IUDs nor oral contraceptives (Andersch & Milsom, 1982). A significant correlation ($p<0.01$) was found between age at menarche and severity of dysmenorrhea. Early menarche was linked to more severe dysmenorrhea (Andersch & Milsom, 1982). A significant correlation ($p \leq 0.01$) between the severity of dysmenorrhea and the duration of menstrual flow was found. The severity of dysmenorrhea increased with increasing duration of menstrual flow (Andersch & Milsom, 1982). Height, weight, and length of the menstrual cycle was not found to affect prevalence or severity of dysmenorrhea (Andersch & Milsom, 1982). Parous women experienced significantly less occurrence ($p \leq 0.01$) and severity of dysmenorrhea than nulliparous women or women who had pregnancies terminated by legal or spontaneous abortion. No significant

difference was found in the prevalence or severity of dysmenorrhea in women who were nulliparous and women who had experienced legal or spontaneous abortion (Andersch & Milsom, 1982). The study suggests that increased menstrual flow is related to increased levels of dysmenorrhea. The number of sanitary napkins or tampons used by subjects was significantly correlated ($p \leq 0.01$) to the severity of dysmenorrhea (Andersch & Milsom, 1982). A significant correlation ($p \leq 0.01$) was found between dysmenorrhea reported by subjects and the incidence of dysmenorrhea in the subjects' mothers and sisters (Andersch & Milsom, 1982). The incidence of dysmenorrhea was found to be significantly less ($p \leq 0.01$) in smokers than in non-smokers (Andersch & Milsom, 1982).

Widholm (1985), performed an epidemiologic study of premenstrual tension and primary dysmenorrhea. Using 1,000 mother-daughter pairs, he reports a significant ($p < 0.001$) correlation between the incidence of dysmenorrhea in mothers and their daughters. Other significant correlations found in this study were height, weight, menarche, cycle, duration, and the presence of premenstrual tension. The researcher concludes that genetic factors and unconscious mimicking play a role in menstrual symptomotology (Widholm, 1985).

Nursing Research in Dysmenorrhea

A study of 55 dysmenorrheic women and 98 women not complaining of dysmenorrhea yielded interesting results. The 55 dysmenorrheic women were mostly Caucasian, mostly never married, well educated and employed or working as students, with a mean age of 25.8. The 98 nondysmenorrheic women used as a

comparison group were mostly Caucasian but with a greater proportion of Black women, mostly never married, well educated and employed with a mean age of 27.3. Dysmenorrheic women were found to have menstrual cycles of normal length with a range of 2 to 7 days and a mean of 4.9 days. The women without dysmenorrhea reported menstrual cycles ranging from 3 to 7 days with a mean of 4.6 days (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987).

A tendency toward heavy flow was noted by these researchers in dysmenorrheic women as compared to nondysmenorrheic women. Almost half of the dysmenorrheic women reported heavy or very heavy flow as compared with 18% of the non-dysmenorrheic women (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987).

Sixty-five per cent of the dysmenorrheic women reported the onset of dysmenorrhea to be between the ages of thirteen and eighteen years of age which is approximately three years past the average age of menarche. Thirty of the fifty-five dysmenorrheic women reported they had cramps one to three days prior to the onset of menstruation. All, but one woman reported cramps during menstruation. Ninety-three per cent of the dysmenorrheic women reported that cramping occurred with every period. Nineteen (34.5%) rated the cramping as moderate, twenty-eight (51%) severe, and eight (14.5%) as disabling. All of the dysmenorrheic women had been experiencing menstrual cramping for at least 1-2 years, with sixty-seven per cent reporting cramping with menstruation for over six years in duration (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987).

Menstrual attitudes were measured in the Shaver, Woods, Wolf-Wilets, & Heitkemper study with the Menstrual Attitude Questionnaire (MAQ) developed by Brooks-Gunn & Ruble (1980). The MAQ consists of thirty-three items and assesses five dimensions of menstrual attitudes. The five dimensions assessed are: menstruation as a debilitating, bothersome, or natural event, anticipation and prediction of menstrual onset, and denial of any effects of menstruation. Participants in the study rated each statement about menstruation on a 7-point scale from strongly disagree to strongly agree (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987). Dysmenorrheic women described menstruation as significantly more debilitating and reported a higher level of anticipating their menses ($p <$ or=.005) than did the nondysmenorrheic women. Dysmenorrheic women rated menstruation significantly less bothersome ($p <$ or=.05) and more natural ($p <$ or=.005) than the nondysmenorrheic women. Dysmenorrheic women scored significantly lower on the denial scale ($p <$ or=.005) than did the nondysmenorrheic women (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987).

The general health perceptions questionnaire (HPQ) was used to measure health perceptions of the dysmenorrheic women in the Shaver, Woods, Wolf-Wilets, & Heitkemper study. The 26 item test covers perceptions of Health, Prior Health, Health Outlook, Resistance/Susceptibility, Health Worry/Concern, and Sickness Orientation. Each item has five response choices: definitely true, mostly true, don't know, mostly false, and definitely false. The HPQ scores of the dysmenorrheic women were compared to the scores obtained from a Rand health insurance survey sample of 527 subjects. The subjects in the Rand survey were predominantly female (64%), median age of 32 years, with a median

education of 14 years, and living in the United States. The dysmenorrheic women scored higher on current health perceptions (38.6+-6.2) than the comparison group (32.7+-7.9). The dysmenorrheic women scored higher on the health outlook portion of the HPQ (17.0+-2.9) than the comparison group (14.2+-2.8). The health worry/concern scores were very similar with the dysmenorrheic women scoring 12.1 +-2.7 and the comparison group 12.1+-2.8 The scores on the sickness scale also were very similar with the dysmenorrheic women scoring 7.5+-2.0 and the comparison group 7.0+-1.8 (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987). Dysmenorrheic women did not view their general health to be compromised as compared with those in the comparison group. Although the dysmenorrheic women experienced moderate to severe pain with their menstruation, dysmenorrhea did not appear to have a great effect on their perceptions of general health. The dysmenorrheic women did not view themselves as being sick. The women appeared to be handling the symptoms on a cognitive level despite the effect of the severe pain related to dysmenorrhea on their lives (Shaver, Woods, Wolf-Wilets, & Heitkemper, 1987).

Acupressure has shown promise in the treatment of morning sickness of pregnancy. Sixteen women in their first trimester of pregnancy used acupressure in a nursing research study (Hyde, 1989). The first group (N=8) used a wristband, which stimulates an acupressure point on the wrist, for five days followed by five days of no therapy. The second group had no therapy for five days followed by five days of the same treatment used on the first group. The extent of nausea was assessed at baseline, day five, and day ten. The Multiple Affect Adjective Checklist and Sickness Impact Profile were the instruments

used in the study. The use of the acupressure wristband was associated with a reduction in morning sickness for 12 of the 16 subjects. Acupressure therapy resulted in statistically significant ($p<.05$) reductions in anxiety, depression, behavioral dysfunction, and nausea (Hyde, 1989).

Summary

This chapter has presented a review of the literature, theoretical an research, related to pain, traditional Chinese medicine, and dysmenorrhea. The evolution of pain theories was presented along with a figure representing the theoretical components of the Gate Control theory of pain experience. The beliefs of traditional Chinese medicine were presented as well as acupuncture and acupressure. Research related to acupuncture was presented. The etiology of primary and secondary dysmenorrhea was presented. Other menstrual-related disorders such as pelvic inflammatory disease, endometriosis, ovarian cyst, adenomyosis, abdominopelvic adhesions and premenstrual syndrome were discussed. Nursing research was presented relating to dysmenorrhea and the use of acupressure for morning sickness.

CHAPTER THREE

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

The purpose of this study was to determine the effect of acupressure on dysmenorrhea. This chapter describes the methodology of the study.

Research Design

One experimental and one control group were used in this study for a quasi-experimental pre-test, post-test control group design with repeated measures. The experimental and control groups were pre-tested and post-tested with the Menstrual Attitude Questionnaire (MAQ). The MAQ was administered to each subject at the beginning of the study and again after the completion of three menstrual cycles. Treatment for dysmenorrhea consisted of the acupressure technique for the experimental group. Subjects in the control group took analgesics as usual for treatment of dysmenorrhea. Subjects in both groups were asked to rate dysmenorrhea pain levels and record pain levels before and after each treatment in diaries kept by the subjects. The subjects in the experimental group were instructed to take analgesics if the acupressure treatment did not relieve dysmenorrheic pain to a tolerable level. Subjects in both groups recorded analgesic use in the diaries.

One threat to internal validity is history. History refers to an unplanned event which occurs during the course of the study and influences the responses of the subjects involved in the study (Burns & Grove, 1987, p. 234). The effects of history on the internal validity of a study can be minimized by the presence of a control group (Waltz & Bausell, 1981).

Maturation is another threat to the internal validity of a study. Maturation refers to changes that occur in the subjects during the study due to the passage of time, such as growing older, wiser, stronger, hungrier, more tired, or more experienced. These changes can influence the findings of the study (Burns & Grove, 1987, p. 235). The presence of a randomly assigned control group helps to differentiate the effect of maturation from the effect of the treatment.

Testing is a threat to the internal validity of a study. A subject may remember responses to a test which influence his or her response when the test is administered at a later time. The process of taking a test may increase a subject's knowledge or change the subject's attitude (Burns & Grove, 1987, p. 235). The Menstrual Attitude Questionnaire was administered in this study to all subjects as a pre-test and post-test. At least three months elapsed between the time each subject took the pre-test and post-test to minimize the effect of the pre-test on the post-test.

Instrumentation can adversely affect the internal validity of a study. A change in measurement instruments between the pre-test and post-test could cause an effect which could falsely be attributed to the treatment. Another example of an instrumentation effect to internal validity is when those serving as observers or data collectors become more experienced as the study progresses (Burns & Grove, 1987, p. 235). In this study, the same questionnaire was used both as a pre-test and post-test and subjects self-reported their responses to the treatment in order to control for the effect of instrumentation.

Statistical regression toward the mean is another threat to internal validity. Subjects who score very low or very high on a pre-test tend to have more moderate scores on a post-test or "regress toward the mean." If pre-test scores were very low and post-test scores were higher, a statistical difference may be noted which is not due to the treatment but due to statistical regression. A conclusion that the treatment caused the effect would be a Type I error, failure to reject an hypothesis which is in reality false. If pre-test scores were very high and post-test scores were lower, due to statistical regression, no significance may be detected. This would lead to a Type II error, rejecting an hypothesis which is in reality true (Burns & Grove, 1987). The threat to internal validity of statistical regression toward the mean is operative only when subjects are selected for a study because they have exhibited extremely high or low scores on the dependent variable. This threat is completely eliminated by the use of a randomly assigned control group (Waltz & Bausell, 1986).

Another threat to internal validity, selection, relates to which subjects participate in a study and how they are grouped. Those selected to be in the study may differ in some way from those not selected. If there are differences between those in the control group and those in the experimental group they may react differently to the treatment. This difference would not be due to the treatment effect as much as group differences. A lack of randomization in a study increases the effect of selection on internal validity (Burns & Grove, 1987). This study randomly assigned subjects to either the control or experimental group to minimize the effect of selection.

Mortality is a threat to internal validity. Mortality refers to the number of subjects who drop out of a study prior to its completion. Mortality is a threat to internal validity when the subjects who drop out of a study are somehow different than the subjects who completed the study or there is a difference between those in the experimental group who dropped out and those in the control group who dropped out (Burns & Grove, 1987). Mortality was a major threat to the internal validity of this study due to a large percentage of subjects who failed to complete the three month study. A comparison of the demographic and pre-test data obtained from the non-completers and the completers is presented in chapter 4 and discussed in chapter 5.

Diffusion or imitation of treatments is another threat to internal validity. This effect occurs when the subjects in the control group gain access to the treatment intended for the experimental group (Burns & Grove, 1987). This was an acknowledged threat to this study because many of the subjects in the control group were in class with or worked with subjects in the experimental group. In an attempt to control for this effect, subjects in the experimental group were taught the acupressure technique in the absence of the subjects in the control group. The subjects in the experimental group were asked by the researcher to not discuss the acupressure technique with the subjects in the control group.

Setting

The pre-test MAQ was administered in a classroom or meeting room setting at the beginning of the study which was a partially controlled environment. Diaries were used by the subjects to record data regarding their

menstrual periods and analgesic use throughout the time of the study. This data was recorded by the subjects in uncontrolled, real-life, or natural situations. The post-test MAQ was given to some subjects in a classroom or meeting room setting. The subjects who could not be contacted were mailed the post-test MAQ to complete in a natural or real-life setting and return by mail to the researcher.

Population and Sample

The target population was menstruating women. The convenience sample consisted of students recruited from a junior college and university campus, as well as faculty at an elementary school in a southwestern state, who met the criteria and consented to participate in the study. Women eighteen years of age or over, who self reported to be in relatively good health and could read and write were eligible to participate in the study. Thirty subjects were placed in each group for a total of sixty subjects. Thirty-two subjects completed the study.

Recruitment of Subjects

A total of four classes were visited by the researcher at the junior college. These four classes each had approximately 25 to 30 women members. Five classes were visited at the university. Four of the five classes contained 20 to 25 women members and the fifth class contained 12 women. An announcement was made at the end of class time regarding the opportunity to participate in the study. The researcher explained that the study was looking at menstrual cramps and a non-pharmacologic and non-invasive technique which may or may not decrease menstrual cramps. It was explained that volunteers were needed who were menstruating women, over eighteen years of age, and English speaking. It

was explained that subjects would sign a consent form, complete a demographic questionnaire, and fill out a questionnaire about attitudes toward menstruation. The students were told that some subjects would be assigned to a group which would keep a diary (supplied by the researcher) for the next three menstrual cycles and record analgesic use for menstrual pain as well as pain levels before and after analgesic use. These subjects would again complete the questionnaire about menstrual attitudes at the completion of the three menstrual cycles. The potential subjects were told that there would be a second group of subjects who would be taught a non-invasive and non-pharmacologic technique to use in the presence of menstrual pain. These subjects would complete the questionnaire on menstrual attitudes at the beginning of the study. The subjects in the second group would be asked to use the technique when menstrual pain occurs and record the before and after pain levels in a diary supplied by the researcher for the next three menstrual cycles. If pain relief did not occur, they were to take analgesics as usual and record analgesic use as well as the before and after pain levels. The subjects in this group would also take the Menstrual Attitude Questionnaire a second time at the completion of the study. Potential risks and measures to protect confidentiality of the information collected in the study, as explained in the next section, were explained to the potential subjects. The researcher met with students interested in participating in the study after the class had dismissed. Those willing to participate in the study were given a consent form to sign. Several women told the researcher they were declining to participate in the study because they did not experience much pain with menstruation and some said they had had a hysterectomy.

Subjects were asked if they were aware of any pathologic conditions they may have involving the uterus such as abnormal position, fibroid tumors, endometriosis, pelvic inflammatory disease, or cervical stenosis. This information could have enabled the researcher to differentiate between primary and secondary dysmenorrhea. Answering affirmatively did not exclude the subject from the study.

A letter explaining all of this information was distributed to faculty at the elementary school. Location, date, and time, were given to meet with the researcher. At this time, the researcher met with the potential subjects, reviewed the information about study participation and enrolled volunteers in the study.

Protection of Human Subjects

Permission to perform this study was granted from the Graduate School following approval of the Human Subjects Review Committee. Subjects were assigned a number and only the researcher knew the identity of the subject. The list of subject's names and code numbers were kept in a separate place from the data collection tools. This list will be kept in a secure place and destroyed one year after the study is completed. Each subject was assigned a number to protect confidentiality. Only one list kept by the researcher identified the subject by name. All other research materials were identified by the subject's assigned number. This list was kept in a separate location than the other research materials. The potential subjects were told the list would be destroyed one year after the completion of the study. Possible risks of participating in the study explained to the potential subjects were breach of confidentiality if the

master list of subject names were inadvertently lost. Possible risks to the subjects in the group using the non-invasive technique would be bruising of the hand. It was explained that all study participants would be given and opportunity to receive information about the final results of the study. The subjects' rights to protection from discomfort were protected by informing the subjects in the experimental group that they need not refrain from taking analgesics for dysmenorrhea if needed. The subjects in the experimental groups were instructed to use the acupressure technique before they took an analgesic for dysmenorrhea.

Pilot Study

Four women participated in a two month pilot program. They were asked to keep diaries, which were provided, and record the dates of their menstrual periods, use of the acupressure technique, and pre- and post-acupressure pain levels.

Subject one

The first subject used the acupressure technique twice on the first day of the first cycle with an increase in pain of one level with the first use. The second use of acupressure resulted in a reduction of pain of two levels. This subject used the acupressure technique twice on the second day of the first cycle with a pain reduction of two levels both times. Analgesics were used three times on the first day of the first cycle with a pain reduction of two levels with the first use and one level with the second and third use. Analgesics were taken three times on the second day of the first cycle with a pain reduction of one level with the first dose and two levels with the second and third doses.

Analgesics were taken twice on the third day of the first cycle with a pain reduction of three levels each time. The first subject used the acupressure technique twice on the third day of the second cycle. Both of these uses resulted in a pain reduction of one level. Analgesics were taken once on the third day with a pain reduction of three levels and once on the fourth day of the second cycle with a pain reduction of three levels.

Subject two

The second subject used the acupressure technique a total of thirty times. On the first day of the first cycle the subject used the acupressure technique three times. The first two applications of acupressure resulted in no pain relief and the third use resulted in a decrease of pain of one level. On the second day of the first cycle, the subject received no pain relief on the first two acupressure uses but received a decrease in pain of one level on the third attempt. On this subject's third day of her first cycle, the first acupressure use resulted in no pain relief but a decrease in pain of one level was experienced on the next two uses. Three uses of the acupressure technique on day four of the first cycle resulted in no pain relief. On day five of the first cycle, the subject received a decrease in pain of one level on the second use of the acupressure technique and no pain relief on the first and third uses. This subject used analgesics three times on the first day of her first cycle. The first analgesic use resulted in a reduction of pain of two levels. The second and third use of analgesics resulted in a reduction in pain of one level. Analgesic use on the second day of cycle one resulted in a pain reduction of one level on the first and second uses and no pain reduction with the third analgesic use. Analgesic use

on day three of the first cycles resulted in no pain relief with the first use and a pain reduction of one level on the second and third uses of analgesics. Analgesic use on the fourth day of cycle one resulted in no pain relief on the first and third uses and a pain reduction of one level with the second analgesic use. Analgesic use on the fifth day of the first cycle resulted in no pain reduction with the first and third analgesic uses and a pain reduction of one level with the second use.

On the first day of this subject's second cycle, the acupressure technique was used three times. There was no reduction of pain on the first and third uses but the second use resulted in a decrease in pain of one level. The subject used the acupressure technique three times on the second day. The first use resulted in a decrease in pain of one level and the second and third uses resulted in no pain relief. The acupressure technique was used three times on the third day. No pain relief was recorded with the first and second uses but a pain relief of one level was recorded with the third use. This subject used the acupressure technique three times on day four of the second cycle. No pain relief was recorded with the first and third use but a pain decrease of one level was recorded with the second use. The acupressure technique was also used three times on day five of the second cycle. No pain relief was recorded with the first and third use but a pain decrease of one level was recorded with the second use. Analgesics were used three times on day one of the first cycle. No decrease in pain was noted with analgesic use with the first two doses. The third dose of analgesic resulted in a pain reduction of one level. On day two of the second cycle, the subject used analgesics three times. A pain reduction level of one was

noted with the first dose and no reduction in pain was recorded with the second and third doses. On the third day of the second cycle, the subject noted a pain relief of one level with the first and second doses of analgesics and no reduction in pain with the third dose. On the third day of the second cycle, the subject used analgesics three times. The second dose resulted in a pain reduction of one level and the first and third doses resulted in no reduction of pain. On the fifth day of the second cycle, the subject used analgesics three times with a reduction in pain of one level each time. This subject used the acupressure technique nineteen times with no reduction of pain. Eleven times there was a reduction of one level of pain. It should be noted that analgesics were used by this subject thirteen times with no reduction of pain.

Subject three

The third subject used the acupressure technique twice on the first day of the first cycle. A pain reduction of one level was recorded with both uses. Analgesics were also taken on the first day with a pain reduction of one level. The acupressure technique was used by subject three three times during the first day of the second cycle. A pain reduction of two levels was noted each of the three times. Analgesics were used once on the first day of the second cycle. The first use of analgesics resulted in a pain reduction of two levels and the second use of analgesics resulted in a pain reduction of one level.

Subject four

The fourth subject used the acupressure technique twice on the first day of the first cycle. A pain reduction of one level was noted with this subject's first use of the acupressure technique. No pain reduction was noted with the second

use of acupressure. No other uses of acupressure or analgesics were recorded with this cycle. The acupressure technique was used twice on the first day of the second cycle with no recorded decrease in menstrual pain. No other acupressure or analgesic use was recorded for this cycle.

Instruments

The McGill Pain Questionnaire (MPQ)

The McGill Pain Questionnaire (MPQ) is an empirically derived tool for assessing pain. The tool consists of the Pain Rating Index (PRI) and the Present Pain Intensity Scale (PPI). The PRI consists of three major classes of 78 word descriptors arranged in twenty groups by patients to describe a pain experience in terms of sensory, affective, and evaluative qualities of the pain experience. The PPI contains a numerical scale from 0 to 5 each accompanied by an evaluative anchor word which is used to provide an evaluation of overall intensity of the pain experience (Melzack, 1975). These anchor words were chosen from the evaluative category and represent equal scale intervals. Instructions and terminology on the PPI are clear and explicit. The PPI provides quantitative information that can be treated statistically. Melzack (1975) reports significant correlation between the PPI and all components of the Pain Rating Index. The MPQ has been accepted by the community on the basis of empirical evidence and widely used in clinical research.

The reliability and validity of the McGill Pain Questionnaire has been estimated. Melzack standardized the MPQ on 297 medical patients. The test was administered three times to subjects with a consistency of 70.3%. Graham, Bond, Gerkovich, and Cook (1980) replicated the research on cancer patients. The test

was administered four times to the subjects with a mean consistency ranging from 66% to 80.4%. No difference was found between the two studies in terms of the "total pain rating index," the "number of words chosen," and in the "sensory" and "affective" scores (Graham, Bond, Gerkovich, and Cook, 1980).

The Menstrual Attitudes Questionnaire

The Menstrual Attitudes Questionnaire (MAQ) is a 33 item Likert type scale developed by Brooks-Gunn and Ruble (1980). The MAQ was developed by the researchers with the goal of a balanced multidimensional menstrual related attitude tool. The researchers found that most studies had looked at only a positive-negative aspect of menstrual related attitudes. The negative aspect of menstruation has historically been emphasized in the literature. The researchers were also interested in what they suspected was a "denial" attitude of any menstrual effects by a subgroup of women. Forty-six items were constructed to represent four dimensions of menstrual attitudes: beliefs about physiological concomitants of menstruation, styles of dealing with menstruation, menstrual-related effects on performance, and general evaluations of menstruation. There was an equal number of statements for each category. The statements were made in a singular and first person manner. Responses were recorded on a 7 point Likert type scale with a response of 1 signifying "disagree strongly" and a response of 7 signifying "agree strongly" (Brooks-Gunn & Ruble, 1980).

The original instrument was tested on a sample consisting of 191 Princeton University undergraduate women. Factor analysis was used to analyze the principal components using a Varimax rotation. Factor analysis relates to

construct validity, which is the degree to which an instrument measures the construct it was designed to measure (Burns & Grove, 1987). Seven factors were identified with eigenvalues over 1.00. Two of the factors contained doublets and were omitted. The five remaining factors were rotated. The five remaining attitude factors were labeled as follows: menstruation as a psychologically and physically debilitating event, as a natural event, as a bothersome event, as an event whose onset can be predicted and anticipated, and as an event that does not and should not affect one's behavior. Thirty-three of the items loaded on at least one of the five factors (Brooks-Gunn & Ruble, 1980). The 33 item MAQ was given to Sample two, 154 college women from three state colleges in New Jersey, to check replicability and internal consistency. This time nine factors with eigenvalues of over 1.00 were found. Four factors contained singles or doublets and were omitted. In one factor, the prediction/anticipation factor, items appeared that had not appeared in the first factor analysis. These items, with salient loadings, were: feeling as fit (0.58), being more tired (0.57), not expecting as much of oneself (0.43), not noticing symptoms (-).77), noticing physiological symptoms (0.61), being affected intellectually (0.61), and being critical of a woman who is upset (-0.45) (Brooks-Gunn & Ruble, 1980).

The 33 item questionnaire was also given to 82 college men with the singular first person "I" being changed to "women." The questionnaire was also administered to 72 sixth and seventh grade girls who were in the public school system in central New Jersey with some items rewritten in a more appropriate language for the subjects' age level. Coefficients of congruence between the five factors in each sample were computed in order to examine the similarity of

the factor structure in the two samples. Congruence was found to be high between the same factors across the two samples, ranging from 0.77 to 0.91. Congruence between the different factors was found to be low, 0.46 or less with the exception of debilitation in Sample one and prediction in Sample two which had a degree of congruence of 0.79 (Brooks-Gunn & Ruble, 1980).

Face validity is a primitive form of validity which refers to whether the instrument appears at face value to measure the construct it is intended to measure (Burns & Grove, 1987). The MAQ appears to have face value.

Concurrent validity was demonstrated by comparing the MAQ to the Moos Menstrual Distress Questionnaire (MDQ). The MDQ includes 46 items divided into eight symptom categories, pain, water retention, negative affect, arousal, autonomic, concentration, behavior change, and control. The original sample of 191 women were asked to complete the MDQ twice, once as if they were in the premenstrual phase of their menstrual cycle (one to two days before the onset of menses) and another time as if they were intermenstrual (seven to ten days before the onset of menses). Sample two was divided in half. One half of the group was asked to complete the MDQ three times relevant to what they experience in their premenstrual, intermenstrual and menstrual phases. The remaining subjects in the second group were asked to complete the MDQ as they felt women in general felt about the three phases of the menstrual cycle, premenstrual, menstrual, and intermenstrual. Correlations were calculated between the subjects' responses on the MAQ and the MDQ. The findings were that women who reported menstruation as a debilitating event reported higher symptoms in all three conditions, self-report, women in general, and as if they

were in the three menstrual phases. There was a significant correlation between menstruation as a debilitating event and pain, negative affect, concentration, behavioral change, and autonomic reactions on the MDQ. Women who reported menstruation as a predictable event reported higher symptomatology on all MDQ scales except arousal and control than women who did not report menstruation as predictable. Women who recorded high denial scores on the MAQ reported less symptomatology on the MDQ for self and women in general, but not as if they were in the three phases of the menstrual cycle. The researchers feel this might be a sample difference since only subjects in Sample 1 were the only ones asked to complete the MDQ "as if" they were in the three menstrual phases. Another possibility considered by the researchers, is that the results are due to a response bias since the women in Sample 1 were asked to respond "as if" they were in the three different phases of the menstrual cycle. Perceiving menstruation as a natural and bothersome event were not related to the MDQ (Brooks-Gunn & Ruble, 1980).

Internal consistency was estimated using Cronbach's alpha coefficents, which were calculated for each factor. The results ranged from .95 to .97 with the exception of the denial factor in Sample one which had an alpha coefficient of 0.90. The researchers attributed the inflated coefficients to the notion that factor analysis techniques capitalize on item homogeneity (Brooks-Gunn & Ruble, 1980). Woods, Most, & Dery (1982) also report a high scale homogeneity on the MAQ with Cronbach's alpha = .80 to .93. Test-retest reliability was not reported by the authors.

Data Collection

Announcements were made in classes at the junior college and the university giving information about the study, and the time and place to meet in order to participate in the study. Written notices containing this information was distributed to faculty and staff members at the elementary school by the principal. Sixty subjects who agreed to participate in the study were randomly assigned to two groups, one control group and one experimental group. Subjects in both the control group and the experimental group were asked to complete the Menstrual Attitude Questionnaire (MAQ). Subjects in both groups were also asked to keep a menstrual diary for three menstrual periods. A pocket-sized notebook was provided by the researcher. The procedure for recording information in the diaries was explained subjects in both groups together. Subjects were asked to record the dates their menstrual period began and ended. The subjects were also asked to note the date, time, and dose of analgesic medications taken for menstrual pain. Subjects were asked to rate their pain level before and thirty minutes after taking an analgesic using the PPI. The subjects were told that the researcher would collect the diaries at the end of three menstrual cycles and each subject would be requested to complete the MAQ a second time. All subjects were given a phone number with which to reach the researcher and were told to contact the researcher for any further questions or if the diary were lost. The researcher promised to replace lost diaries. Questions about the study were solicited by the researcher. When there were no more questions the subjects in the control group were dismissed.

Subjects in the experimental group were taught the acupressure technique, to be used during the three menstrual periods. The acupressure technique consists of applying pressure on the dorsal surface of the hand between the index finger and the thumb on the protuberance of the muscle on the radial side in the middle of the metacarpal (Warren, 1976). Subjects in the experimental group were told apply pressure with the index finger and the thumb of the opposite hand. They were instructed to apply pressure first on one hand then on the other. The researcher informed the subjects to attempt to find the spot. They were told that they would know when they had located the acupressure point because that exact area would feel more "tender" to pressure by the opposite thumbnail than the surrounding area. Each subject in the experimental group performed the technique as a return demonstration for the researcher. Each subject in the experimental group stated they felt the tenderness in the acupressure point. The subjects were told to maintain pressure for fifteen to thirty seconds when using this technique for menstrual pain. They were instructed to perform this technique in the presence of menstrual pain and record the date and time in the diary. The subjects were also asked to rate their pain before and after the technique on the Present Pain Intensity Scale and record the pain ratings. The Present Pain Intensity Scale was printed in the notebook next to the designated space for recording the pain ratings. Questions about the study were solicited by the researcher. After all questions were answered the subjects in the experimental group were dismissed.

After approximately three and a half to four months, the researcher attempted to collect the diaries. The researcher made an announcement in the

various classes the week before the diaries were to be collected. The researcher collected diaries from some of the subjects and administered the post-test MAQ to these subjects. Some subjects stated they had not completed the third menstrual cycle and others forgot to bring their diaries. Arrangements were made to pick up these diaries and administer the MAQ post-test to these subjects at a later time. The researcher attempted to contact subjects by phone when the diaries were not returned. Many subjects said they had not kept the diary for the three month time period or had lost it. One subject who had lost her diary and attempted to record the desired information turned in notes which were unusable by the researcher. Two subjects were unreachable in person or by phone. Thirty-two diaries were collected by the researcher for data analysis.

Research Hypotheses

The hypotheses for the study were:

H_{1a}: There is no significant difference in pre-treatment dysmenorrheic pain between women who use acupressure treatment and women who only use analgesic treatment.

H_{1b}: There is no significant difference in post-treatment dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment.

H_2: There is no significant difference between pre-treatment and post-treatment dysmenorrheic pain in women who receive analgesics.

H_3: There is no significant difference between pre-treatment and post-treatment dysmenorrheic pain in women who receive acupressure.

H_4: There is no significant difference in post-analgesic dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment.

H_5: There is no significant difference in pre- and post-treatment menstrual attitudes between women who receive analgesic treatment as measured by the MAQ.

H_6: There is no significant difference in pre- and post-treatment menstrual attitudes between women who receive acupressure treatment as measured by the MAQ.

H_7: There is no significant difference in the number of times analgesics are used between women who receive acupressure treatment and women who receive analgesic treatment.

Treatment of Data

Hypotheses 1a, 1b, two, and three were tested using repeated measures analysis of variance. The researcher used the diaries turned in by the subjects completing the study to compile data for analysis. The total pre-treatment PPI levels for each month were divided by the total number of treatments. A monthly post-treatment PPI score was calculated for each subject in a similar fashion for a monthly average pre- and post-treatment PPI score for each subject for each month. Repeated measures analysis of variance was used to compare the pre-treatment and post-treatment (acupressure for group 1 and analgesics for group 2) monthly average pain levels in the experimental and control groups. The pre- and post- treatment monthly PPI scores of the two groups for the three months were analyzed using a three way repeated

measures analysis of variance. When there are an experimental and control group which are each measured pre-experiment and post-experiment it is called a mixed design because there are between- and within-subject measures. The differences between the two groups are considered the between-group measures. Comparing these groups tells the researcher whether or not the experimental condition had an effect on the outcome. The within-subject measures tells the researcher whether there is a difference on the pre-test and post-test measures. There is also an interaction effect between the group and time (Munro & Page, 1993). The three independent variables were group, month, and test. The independent variable of group had two levels: group 1, the experimental group, and group 2, the control group. The independent variable of month had three levels: month 1, month 2, and month 3, which corresponded to the first, second, and third menstrual cycles of the study. The independent variable of test had two levels consisting of the pre-test and post-test.

The basic assumptions for analysis of variance (ANOVA) that relate to repeated measures analysis of variance are that the dependent variable should be normally distributed and there should be homogeneity of variance. An additional assumption that relates to repeated measures analysis of variance is that of compound symmetry. There are two components to the assumption of compound symmetry. The first is that the correlations across the measurements are the same. The second is that the variances should be equal across the measurements. The general robustness of ANOVA does not withstand much violation of the assumption of compound symmetry. Measures of behavioral data rarely meet the assumptions of compound symmetry in practice (Munro &

Page, 1993). The Bartlett-Box univariate homogeneity of variance test was used to test whether the two groups had equal variances on the pre-test, post-test at each of the three months. Box's M test was used to determine if the variance-covariance matrices were equal across all levels of the between subjects factor. The Mauchly sphericity test was used to test the assumptions underlying compound symmetry. Another option to the use of the multivariate approach is to use an "epsilon" correction factor. The epsilon value is multiplied by the degrees of freedom in the numerator and denominator and the new degrees of freedom are used to test the F value. The Greenhouse-Geisser epsilon is conservative, while the Huynh-Feldt epsilon is a more improved and robust test. SPSS also produces the lowest possible correction factor which is the lower bound epsilon (Munro & Page, 1993). The epsilon correction factor was used to correct for violations of the assumption of compound symmetry.

Hypothesis 4: The statement of no significant difference in post-analgesic dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment was tested using repeated measures analysis of variance. The post-analgesic pain scores for the experimental group were compared with the post-treatment or post-analgesic scores of the control group.

Hypotheses 5 and 6, the statement of no significant difference between pre- and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ and hypothesis 6, the statement of no significant difference between pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ were tested

using analysis of covariance. The assumptions of ANCOVA are: 1) The groups should be mutually exclusive, 2) The variances of the groups should be equivalent, 3) Interval or ratio level data should be used for the dependent variable, 4) The dependent variable should be normally distributed, 5) The covariate should be measured at the interval or ratio level, 6) The covariate and the dependent variable must show a linear relationship. The test is most effective when the relationship lies above $r = 0.30$. 7) The direction and strength of the relationship between the covariate and dependent variable must be similar in each group (Munro & Page, 1993). The effect of the analgesic treatment on menstrual attitudes was analyzed by using the before and after scores on the Menstrual Attitudes Questionnaire in both the experimental and control groups. The MAQ items were divided into the five subscales. Subscale one, Menstruation as a debilitating event, included test items 1, 2, 7, 8, 13, 14, 18, 19, 22, 24, 29, and 30. Subscale two, Menstruation as a bothersome event, included items 3, 9, 15, 20, 25, and 31. Subscale three, Menstruation as a natural event, included items 4, 9, 10, 21, and 26. Subscale four, Anticipation and prediction of the onset of menstruation, included items 5, 11, 16, 22, and 27. Subscale five, Denial of any effect of menstruation, included items 1, 2, 9, 11, 15, 17, 18, 19, and 24. The scores in items 1, 2, 9, 11, 15, 17, 18, and 24 were reversed. The answers for the items included in each factor were totalled, giving an overall score for the subscale.

Hypothesis seven, the statement of no significant difference in number of times analgesics used among women who receive acupressure treatment and women who receive analgesic treatment was tested using repeated measures

analysis of variance. The number of pain interventions i. e. acupressure uses for group one and analgesic use for group two were compared using repeated measures analysis of variance. The total number of times that the group one used acupressure in a month was divided by the number of days in that month's menstrual period for a daily average for each month. The daily average for each month of the number of times the subjects in group two took analgesics was calculated in a similar fashion. The daily averages for the three months of the two groups were analyzed using repeated measures analysis of variance. Differences in age, years of college education, and number of children given birth to between the women who completed the study and the women who did not were analyzed using analysis of variance. The assumptions of multivariate analysis of variance are: random sampling, normal distribution, equal variances across the groups on the dependent variable, and a multivariate normal distribution with the same covariance matrix in each group (Munro & Page, 1993). The differences in the five MAQ pre-test subscales of the completers and non-completers were analyzed using analysis of variance.

Summary

This chapter reviewed the procedure for collection and treatment of data. The research design, setting, population, and sample were discussed. Measures for protection of human subjects were presented. Instruments used in the study were described with previous estimates of reliability and validity testing. Data collection procedures and the statistical treatment of data were discussed.

CHAPTER FOUR

ANALYSIS OF DATA

This chapter discusses the analysis of the data collected for the study. The sample subjects are profiled using standard descriptive statistics. Findings are organized by hypotheses and the results of the various statistical analyses are reported. This chapter concludes with a summary of findings.

Description of the Sample

A total of 60 women began the study and 32 completed the study. The subjects were divided into two groups. The ages of the subjects in group one ranged from 20 to 48 years of age. The standard deviation was 8.53 years. Mean age was 31.67 years. Median age was 33.0 years and the mode was 36.0 years. The ages of the subjects in group two ranged from 21 to 44 years of age. The standard deviation was 6.93 years. Mean age was 28.15 years. Median age was 26.5 years and the mode was 22.0 years. The distribution of subjects by age within the two sample groups are reported in Table one.

Table 1

Distribution of Subjects by Age Within Sample Groups

Age	Group One Frequency	Percent	Group Two Frequency	Percent
20	1	8.3		
21			3	15.0
22	1	8.3	4	20.0
23	1	8.3	1	5.0
24	1	8.3	1	5.0
25			1	5.0
26				
27				
28	1	8.3	1	5.0
29			1	5.0
30	1	8.3	1	5.0
31				
32			1	5.0
33			1	5.0
34			1	5.0
35			1	5.0
36	3	25.0	1	5.0
37	1	8.3		
38				
39			1	5.0
40				
41				
42				
43				
44			1	5.0
45				
46				
47	1	8.3		
48	1	8.3		
Number	12		20	
Range	20 to 48		21 to 44	
Mean	31.67		28.15	
Standard Deviation	8.53		6.93	

All subjects were high school graduates. The years of college education obtained by the subjects in group one ranged from one year to fifteen years. The standard deviation was 3.61 years. The mean number of years of college education obtained by the subjects in group one was 4.50. Four years of college education was the median and the mode. The years of college education obtained by the subjects in group two ranged from one year to five years with one case of a missing value. The standard deviation was 1.13 years. The mean number of years of college education obtained by the subjects in group two was 3.05. Two years of college education was the mode and 3.00 years of college was the median. The distribution of the subjects in the two groups by years of college education within sample groups is reported in Table two.

Table 2

Distribution of Subjects by Years of College Education Within Sample Groups

Years of College	Group One Frequency	Percent	Group Two Frequency	Percent
1 year	1	8.3	1	5.0
2 years	2	16.7	6	30.0
3 years	2	16.7	5	25.0
4 years	3	25.0	5	25.0
5 years	2	16.7	2	10.0
6 years	1	8.3		
15 years	1	8.3		
Missing			1	5.0
Number	12		20	
Range	1 to 15		1 to 5	
Mean	4.50		3.05	
Standard Deviation	3.61		1.13	

Subjects were asked how many children to which they had given birth. The number of children subjects in group one had given birth to ranged from 0 to 5. The standard deviation was 1.78. The mode was 0. The number of children the subjects in group two had given birth to ranged from 0 to 3. The standard deviation was .99. The mode was 0. The distribution of the subjects in group one are reported in Table three.

Table 3

Distribution of Subjects by Number of Children Given Birth to Within Sample Groups

Number of children given birth to	Group One Frequency	Percent	Group Two Frequency	Percent
0	6	50.0	9	45.0
1	2	16.7	4	20.0
2	1	8.3	6	30.0
3	1	8.3	1	5.0
4	1	8.3		
5	1	8.3		
Number	12		20	
Range	0 to 5		0 to 3	
Standard Deviation	1.78		.999	

Subjects were asked to answer yes or no to the question of whether or not they had had a pelvic exam by a doctor or nurse within the previous two years. The distribution of subjects by report of pelvic exam within the previous two years within the sample groups is reported in Table four.

Table 4

Distribution of Subjects by Pelvic Exam Within 2 Years Within Sample Groups

Pelvic exam within 2 years	Group One Frequency	Percent	Group Two Frequency	Percent
Yes	10	83.3	16	80.0
No	2	16.7	4	20.0
Number	12		20	

Subjects were asked if they had been told of any pathology related to the reproductive tract. Subjects who answered that they had not had a pelvic exam within the previous two years were considered to have missing data on the question of pathology. The distribution of subjects in groups one and two according to self-reported pathology diagnosed by a doctor or nurse is reported in Table five.

Table 5

Distribution of Subjects by Report of Diagnosed Pathology Within Sample Groups

Diagnosed Pathology	Group One Frequency	Percent	Group Two Frequency	Percent
Yes	4	33.3	9	45.0
No	6	50.0	8	40.0
Missing data	2	16.7	3	15.0
Number	12		20	

Data Analysis and Hypothesis Testing

The hypotheses for this study were tested by repeated measures analysis of variance and analysis of covariance. Analysis of variance was used to test differenced between the women who completed the study and the women who did not.

Hypothesis 1a

Hypothesis 1a stated: there is no significant difference in pre-treatment dysmenorrheic pain between women who use only acupressure treatment and women who use analgesic treatment. Hypothesis 1a was tested using repeated measures analysis of variance. The results are reported in Table 8. Repeated measures analysis of variance is based on the assumptions that the dependent variable is normally distributed and there is homogeneity of variance. Since repeated measures are from the same people, there is a correlation between

the measures. Therefore an additional assumption, compound symmetry must be met. The assumption of compound symmetry has two components. The first component specifies that the correlations across the measurements are the same while the second stipulates that the variances should be equal across measurements. The assumption of compound symmetry is critical because the general robustness of ANOVA will not withstand much violation of this assumption (Munro & Page, 1993). The use of repeated measures ANOVA in this study is a is a mixed design because there are between and within subject measures. Differences between the experimental group and the control group represent the between group measures. Differences within groups equal differences between the different measurements of the dependent variable (Munro & Page, 1993). A total of nine women in group one and eighteen women in group two had complete data on pre- and post-treatment pain levels available for analysis. Women in both groups were asked to rate their dysmenorrheic pain on the PPI scale of 0 to 5, with 5 being the greatest level of pain and 0 signifying no pain, before any pain interventions were taken. The pre-treatment scores for each day were totaled and divided by the frequency of pain interventions for a daily mean. The daily averages were totaled and divided by the number of days in that particular menstrual period for a monthly average. The means and standard deviations for the three monthly averages of pre-treatment dysmenorrheic pain for groups one and two are listed in Table six. Bartlett-Box tests of univariate homogeneity of variance were performed on the pre-treatment data each month for both groups and are reported in Table six.

Table 6

Mean and Standard Deviation of Pre-treatment Pain Scores by Month

Group	Number	Month 1 Mean	Month 1 S.D.	Month 2 Mean	Month 2 S.D.	Month 3 Mean	Month 3 S.D.
1	9	1.068	.934	.791	.717	.830	.392
2	18	.764	.667	.609	.656	.551	.615
Both	27	.865	.762	.670	.669	.644	.559

The Bartlett-Box F value	Month 1 = 1.24889 (p = .264)	Month 2 = .08275 (p = .774)	Month 3 = 1.85618 (p = .173)

The Bartlett-Box univariate homogeneity of variance tests whether the two groups have equal variances at each of the time periods. The p values ranged from .173 to .774 demonstrating that the pre-acupressure pain levels of Group one did not differ significantly in terms of variance from the pre-analgesic pain levels of Group two.

Hypothesis 1b

Hypothesis 1b stated: There is no significant difference in post-treatment dysmenorrheic pain between women who use only acupressure treatment and women who use analgesic treatment. Hypothesis 1b was tested using repeated measures analysis of variance and reported in Table eight. Women in both groups were asked to rate their pain on the PPI 0 to 5 scale a second time after pain interventions were taken. The pain intervention for the women in group one consisted of the acupressure technique. The women

in group one were asked to rate their dysmenorrheic pain levels immediately after performing the acupressure technique. The pain intervention for the women in group two consisted of analgesic use as was usual for them. The women in group two were asked to rate their post-treatment pain level thirty minutes after taking an analgesic. The post-treatment scores for each day were totaled and divided by the frequency of pain interventions for a daily mean. The daily means were totaled and divided by the number of days of that particular menstrual period for a monthly average. The means and standard deviations of post-treatment pain scores for groups one and two for the three different months are reported in Table seven. Bartlett-Box tests of univariate homogeneity of variance were performed on the pre-treatment data each month for both groups and are reported in Table seven. The summary of analysis of variance with repeated measures of pre-and post-acupressure PPI scores for Group one and pre-and post-analgesic PPI scores for Group two are reported in Table eight.

Table 7

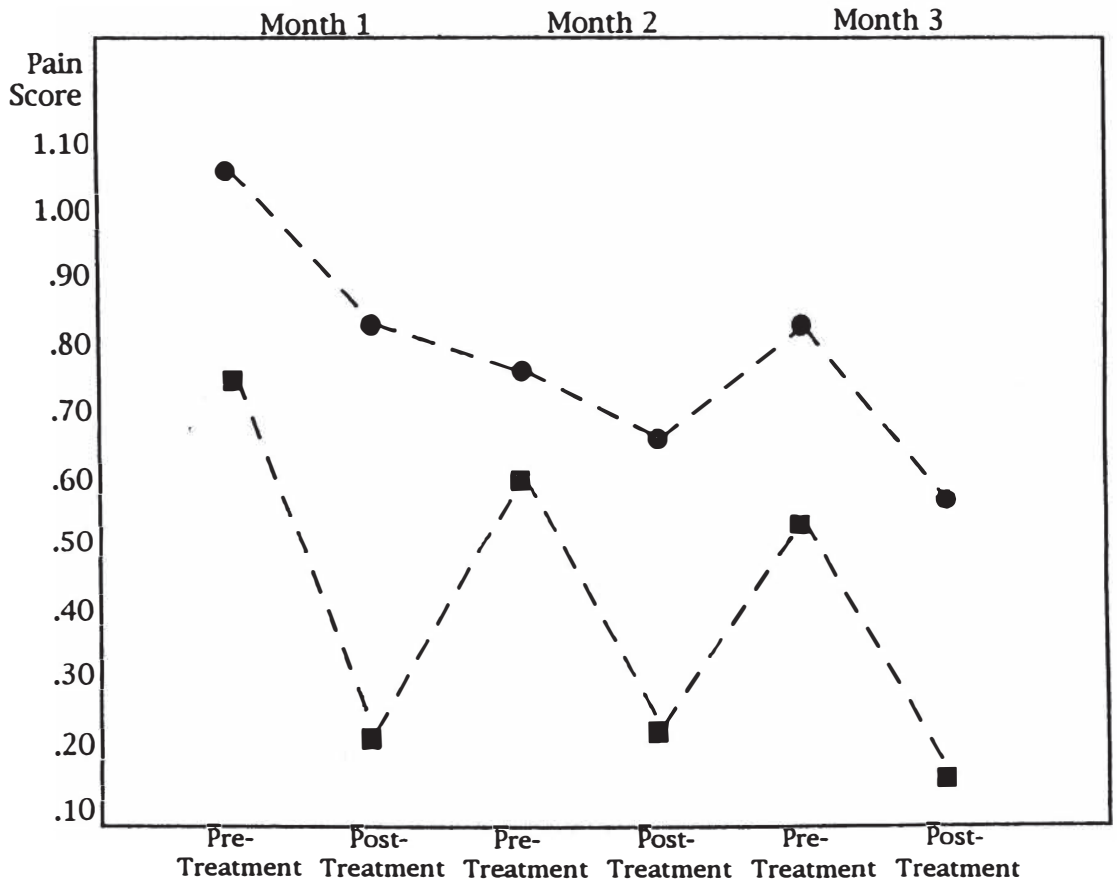
Mean and Standard Deviation of Post-treatment Pain Scores by Month

Group	Number	Month 1 Mean	Month 1 S.D.	Month 2 Mean	Month 2 S.D.	Month 3 Mean	Month 3 S.D.
1	9	.845	.980	.683	.707	.595	.493
2	18	.219	.276	.225	.335	.174	.196
Both	27	.428	.660	.377	.525	.314	.375
The Bartlett-Box F value		Month 1 = 17.83668 (p = .000)* * significant, p < .01		Month 2 = 6.37214 (p = .012)* * significant p < .05		Month 3 = 9.69283 (p = .002)* *significant p < .01	

The Bartlett-Box univariate homogeneity of variance values ranged from .000 to .012 demonstrating that the the post-acupressure pain levels of Group one differed significantly in terms of variance from the post-analgesic pain levels of Group two.

Figure 4

Mean Pre-and Post-Treatment Pain Scores for Both Groups for All Three Months



Key
● =acupressure group
■ =analgesic group

Table eight is a summary of a three way analysis of variance of pre- and post-acupressure scores of group one and pre- and post-acnalgesic scores of group two. Group is an independent variable which has two levels; group one, the acupressure group, and group two, the analgesic group. The second independent variable is month; which has three levels; month one, month two, and month three. The third independent variable is test; which has two levels, pre-test and post-test. The dependent variable is pain level which was rated on a scale of 0 to 5.

The information presented in Table eight answers seven questions:

Is there an overall difference between the two groups? The month and test are ignored and two group means (pre-test and post-test scores for all three months for each group) are compared and reported as the "Group" value. There did appear to be an overall difference between the two groups ($F = 4.75$, $p = .039$). Tables six and seven which are summarized in Figure four illustrate that the pre-test and post-test means of the experimental group were higher than each of the pre-test and post-test means of the control group. The subjects in the experimental group appeared to have higher levels of pain before and after treatment as compared to the control group.

Is there an overall difference between the months? The group and test are ignored and the three monthly means consisting of the pre-test and post-test scores for both groups for each of the months are compared and reported as the "Month" value. No overall difference between the months was demonstrated ($F = 1.37$, $p = .263$).

Is there an interaction effect between group and month? In other words, were there significantly different pain levels for one group for a particular month as compared to other months? The test is ignored and the monthly means for each group are compared and reported as the "Group by Month" value. No significant interaction effect between group and month was demonstrated ($F = .21$, $p = .812$).

Is there a difference between pre-tests and post-tests? The group and month are ignored and the means of all of the pre-tests (for both groups, all three months) are compared to the means of all of the post-tests (for both groups all three months) and reported as the "Test" values. A significant test effect was detected ($F = 15.82$, $p = .001$). This suggests that both groups received significant decreases in pain whether they used acupressure or analgesics.

Is there a group by test interaction? In other words, did one group have more of a difference between the pre-tests and post-tests than the other group? The month is ignored and the pre-test and post-test means of the two groups are compared and reported as the "Group by Test" values. No significant group by test interaction effect was detected ($F = 2.47$, $p = .128$). It appears that the decrease in pain experienced by those using acupressure was not significantly different than the decrease in pain experienced by those using analgesics.

Is there a month by test interaction? In other words, was there a significant difference between pre-test and post-test scores during a particular month as compared to the other months? The group is ignored and the pre-test and post-test means of the three months are compared and

reported as the "Month by Test" values. No significant month by test interaction was detected ($F = 1.81$, $p = .174$). It appears that the pain decrease experienced by both groups was equal across the three months.

Is there a group by month by test interaction? In other words, did one group experience more of a difference in pre-test and post-test scores in a given month than other months or than the other group in the three months. Twelve means are compared to answer this question. The two test means (pre-test and post-test) of each of the three months of the two groups are compared to see if one group had a significant difference between pre- and post-test means in a given month. This value is reported as the "Group by Month by Test" values. No significant group by month by test effect was demonstrated ($F = .82$, $p = .445$).

Table 8

Summary of Analysis of Variance with Repeated Measures of Pre-and Post-acupressure PPI Scores Group One and Pre-and Post-analgesic PPI Scores Group Two

Source	Sum of Squares	df	Mean Squares	F Ratio	Significance of F
Group	5.15	1	5.15	4.75	.039*
within cells	27.13	25	1.09		
Month	.93	2	.46	1.37	.263
within cells	16.96	50	.34		
Group by month	.14	2	.07	.21	.812
Test	3.50	1	3.50	15.82	.001**
within cells	5.53	25	.22		
Group by Test	.55	1	.55	2.47	.128
Month by Test	.11	2	.06	1.81	.174
within cells	1.58	50	.03		
Group by month by test	.05	2	.03	.82	.445

Box's M F value (df 21, 971) = 2.27779, (p = .001)***

* significant, $p < .05$
** significant, $p < .01$
*** significant, $p < .001$

Table 9

Tests Involving "Month" Within-subject Effect

Mauchly sphericity test, W =	.58824
Chi-square approx. =	12.73468 with 2 D.F.
Significance =	.002*
Greenhouse-Geisser Epsilon =	.70834
Huynh-Feldt Epsilon =	.76856
Lower bound Epsilon =	.50000

* Significant, $p < .01$

Table 10

Tests Involving "Month by Test" Within-subject Effect

Mauchly sphericity test, W =	.86874
Chí-square approx. =	3.37712 with 2 D.F.
Significance =	.185
Greenhouse-Geisser Epsilon =	.88397
Huynh-Feldt Epsilon =	.98429
Lower bound Epsilon =	.50000

The Boxs M F value of 2.27779, with DF = 21, 971, (p = .001) indicate that the variance-covariance matrices are not equal across the two groups. Therefore the assumptions of compound symmetry are not met. Mauchly's sphericity for the "Month" effect, .58824, (p = .002), also indicates that the assumption of compound symmetry has not been met. Behavioral data rarely meet the assumption of compound symmetry (Munro & Page, 1993). An epsilon correction approach can be used when the assumptions for univariate

analysis of variance are not met. The degrees of freedom are multiplied by the epsilon value to decrease the likelihood of a Type One error. The resulting degrees of freedom are smaller, requiring a larger F value for significance. There are three epsilons that can be used in this correction technique. The conservative Greenhouse-Geisser epsilon, the improved and more robust Huynh-Feldt epsilon, and the lower bound epsilon (Munro & Page, 1993).

The null hypothesis 1a, (there is no significant difference in pre-treatment dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment), and hypothesis 1b, (there is no significant difference in post-treatment dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment) were not supported by repeated measures analysis of variance. The between-subjects group effect is reported as $F = 4.75$ with $p = .039$. The difference between the two groups was significant regardless of the month or the pre-test or post-test. Group one had higher pre- and post-acupressure PPI score means as compared to Group two pre- and post-analgesic PPI score means for all three months. This is illustrated in a graph of the mean pre-and post-treatment pain scores for groups one and two in Figure 3. The Bartlett-Box test for univariate homogeneity demonstrates homogeneity between the two groups' pre-treatment PPI scores on all three months. The Bartlett-Box test also demonstrates a significant difference in homogeneity between the groups on the post-treatment pain scores for all three months of the study.

There was no significant difference in the pre-treatment and post-treatment pain scores of the two groups related to the month of the study. The F value for the effect of month was 1.37 (p = .263). There was also no significant group by month interaction. Neither of the groups had significant pre-treatment and post-treatment differences that were related to a particular month. The F value for the group by month interaction was .21 (p = .812).

Hypotheses Two & Three

The null hypothesis two, (there will be no significant difference in pre- and post-treatment pain levels in the control group) and the null hypothesis three, (there is no significant difference in pre-treatment and post-treatment dysmenorrheic pain among women who receive acupressure) were not supported by repeated measures analysis of variance. Significance is indicated related to the test effect. The F value was 15.82 (p= .001). Since the assumption of compound symmetry was violated, the epsilon correction factor was used. The degrees of freedom of 1 and 25 are multiplied by the epsilon and the F score is compared to the tabled value using the new degrees of freedom. Using the conservative Greenhouse-Geisser epsilon value of .88397 the resulting degrees of freedom are .88397 and 22.09925. The corrected degrees of freedom using the robust Huynh-Feldt epsilon value of .98429 are .98429 and 24.607. The corrected degrees of freedom using the lower bound epsilon of .5000 results in .5000 and 12.5 degrees of freedom. Using the corrected degrees of freedom, the F value of 15.82 is significant at the .01 level using the Greenhouse-Gesisser correction, the Huynh-Feldt, and the lower bound epsilon corrections. This demonstrates that there was a significant difference

between the pre-treatment and post-treatment pain scores regardless of the group or month. Group one had significant pain reduction with the use of acupressure and Group two had significant pain reduction with analgesic use.

No significant group by test interaction was detected ($F = 2.47$, $p = .128$). This signifies that no group had a greater pre-treatment or post-treatment difference in pain scores than the other group. There was no significant month by test effect ($F = 1.81$, $p = .174$). There was no difference in pre-treatment and post-treatment pain scores related to a particular month.

No significant group by month by test interaction was noted ($F = .82$, $p = .445$). There was no difference in pre-treatment or post-treatment pain scores related to one group during a particular month.

Hypothesis Four

Hypothesis four stated: there will be no significant difference in post-analgesic dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment was tested using repeated measures analysis of variance of the post-analgesic PPI scores for the two groups. The subjects in group one whose pain was not relieved to a tolerable level by acupressure were told not to hesitate to take analgesics for dysmenorrheic pain. They were asked to rate their pain on the PPI 0 to 5 scale before taking the analgesic and again thirty minutes later. The PPI scores were added and divided by the number of times analgesics were taken for a daily average. The daily averages were divided by the number of days in that particular menstrual period. Ten women in group one and eighteen women in group two had complete data on post-analgesic PPI scores for the three months

available for analysis. The means and standard deviations of pre-analgesic levels for groups one and two are reported in Table 11. The mean and standard deviations of post-analgesic pain levels for groups one and two are reported in Table 12. Bartlett-Box tests of univariate homogeneity of variance were performed on the pre-and post-analgesic data each month for both groups and are reported with Tables 11 and 12. The summary of repeated measures analysis of variance of both groups' pre- and post-analgesic scores are reported in Table 13.

Table 11

Mean and Standard Deviation of Pre-analgesic Pain Scores by Month

Group	Number	Month 1 Mean	Month 1 S.D.	Month 2 Mean	Month 2 S.D.	Month 3 Mean	Month 3 S.D.
1	9	.525	.685	.463	.531	.411	.548
2	18	.764	.667	.609	.656	.551	.615
Both	27	.678	.671	.557	.609	.501	.586
The Bartlett-Box F value		Month 1 = .00745 (p = .931)		Month 2 = .48077 (p = .488)		Month 3 = .14709 (p = .701)	

Table 12

Mean and Standard Deviation of Post-analgesic Pain Scores by Month

Group	Number	Month 1 Mean	Month 1 S.D.	Month 2 Mean	Month 2 S.D.	Month 3 Mean	Month 3 S.D.
1	10	.158	.170	.199	.242	.187	.319
2	18	.219	.276	.225	.335	.174	.196
Both	27	.197	.242	.215	.301	.179	.241
The Bartlett-Box F value		Month 1 = 2.36564 (p = .124)		Month 2 = 1.09976 (p = .294)		Month 3 = 2.83037 (p = .093)	

Table 13

Summary of Repeated Measures Analysis of Variance with Repeated Measures of Pre-and Post-analgesic PPI Scores Groups One and Two

Source	Sum of Squares	df	Mean Squares	F Ratio	Significance of F
Group	.39	1	.39	.53	.472
within cells	18.86	26	.73		
Month	.19	2	.09	.59	.560
within cells	8.37	52	.16		
Group by month	.05	2	.03	.16	.851
Test	5.00	1	5.00	20.15	.000*
within cells	6.45	26	.25		
Group by Test	.22	1	.22	.88	.358
Month by Test	.18	2	.09	1.75	.185
within cells	2.68	52	.05		
Group by month by test	.01	2	.00	.05	.951

*significant, $p < .01$

The information in Table 13 answers seven questions:

Is there an overall difference between the two groups? The month and test are ignored and two group means (pre-analgesic and post-analgesic scores for all three months for each group) are compared and reported as the "Group" value. A significant group difference was not demonstrated ($F = .53$, $p = .472$).

Is there an overall difference between the months? The group and test are ignored and the three monthly means consisting of the pre-test and post-test scores for both groups for each of the months are compared and reported

as the "Month" value. No overall difference between the months was demonstrated (F = .59, p = .560).

Is there an interaction effect between group and month? In other words, were there significantly different pain levels for one group for a particular month as compared to other months? The test is ignored and the monthly means for each group are compared and reported as the "Group by Month" value. No significant interaction effect between group and month was demonstrated (F = .16, p = .851).

Is there a difference between pre-tests and post-tests? The group and month are ignored and the means of all of the pre-tests (for both groups, all three months) are compared to the means of all of the post-tests (for both groups all three months) and reported as the "Test" values. A significant test effect was detected (F = 20.15, p = .000). This suggests that both groups received significant decreases in pain after analgesic use.

Is there a group by test interaction? In other words, did one group have more of a difference between the pre-tests and post-tests than the other group? The month is ignored and the pre-test and post-test means of the two groups are compared and reported as the "Group by Test" values. No significant group by test interaction effect was detected (F = .88, p = .358). It appears that the decrease in pain experienced by those in both groups after analgesic use was not significantly different.

Is there a month by test interaction? In other words, was there a significant difference between pre-test and post-test scores during a particular month as compared to the other months? The group is ignored and

the pre-test and post-test means of the three months are compared and reported as the "Month by Test" values. No significant month by test interaction was detected (F = 1.75, p = .185). It appears that the pain decrease experienced by both groups was equal across the three months.

Is there a group by month by test interaction? In other words, did one group experience more of a difference in pre-test and post-test scores in a given month than other months or than the other group in the three months. Twelve means are compared to answer this question. The two test means (pre-test and post-test) of each of the three months of the two groups are compared to see if one group had a significant difference between pre- and post-test means in a given month. This value is reported as the "Group by Month by Test" values. No significant group by month by test effect was demonstrated (F = .05, p = .951).

The null hypothesis four, there is no significant difference in post-analgesic dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment was supported. The non-significant Bartlett-Box F values for the pre-analgesic and post-analgesic pain scores indicate that the assumption of compound symmetry for repeated measures analysis of variance was met. There was no significant group difference between pre- and post-analgesic scores for the three months (F = .53, p = .473). There was a non-significant month difference between the pre-analgesic and post-analgesic for the two groups (F = .59,p = .560). No group by month interaction was detected. No group had significantly different pre-analgesic or post-analgesic scores related to a particular month (F =.16 , p=

.851). There was a significant (p=.000) difference in pre- and post-analgesic PPI scores regardless of the month or group. This finding suggests that both groups had a significant reduction in pain after taking analgesics. No significant group by test difference was observed (F =.88, p = .358) meaning that no one group had significantly different pre-analgesic and post-analgesic pain scores. There was no significant month by test effect detected (F = 1.75, p = .185) meaning that there was no significant pre-analgesic or post-analgesic pain score differences related to one month more so than the other months. There was no significant group by month by test effect (F = .05, p = .951) meaning that one group did not differ significantly on the pre-analgesic or post-analgesic pain scores in a given month as compared to the other group in other months.

Hypotheses Five & Six

The null hypothesis five, (there is no significant difference in pre-and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ) and the null hypothesis 6, (there is no significant difference in pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ) were tested using analysis of covariance (ANCOVA). Analysis of covariance combines ANOVA with regression to measure differences in group means after allowing for other differences between subjects. The effect of a covariate, a variable which is neither independent or dependent but influences the groups being compared, is measured and extracted from the within (or error) variation. The assumptions of ANCOVA are: 1) The groups should be mutually exclusive,

2) The variances of the groups should be equivalent, 3) Interval or ratio level data should be used for the dependent variable, 4) The dependent variable should be normally distributed, 5) The covariate should be measured at the interval or ratio level, 6) The covariate and the dependent variable must show a linear relationship. The test is most effective when the relationship lies above $r = 0.30$. 7) The direction and strength of the relationship between the covariate and dependent variable must be similar in each group (Munro & Page, 1993). The test items in the MAQ were grouped into five categories, Factor 1 is "Menstruation as a debilitating event," Factor 2 is "Menstruation as a bothersome event," Factor 3 is "Menstruation as a natural event," Factor 4 is "Anticipation and prediction of the onset of menstruation," and Factor 5 is "Denial of any effect of menstruation." The pre-test scores consist of answers given on the MAQ by the subjects upon admission to the study. The post-test scores are answers given on the MAQ at the completion of the study. The correlation between the pre-test and post-test answers for each of the five subscales of the MAQ was 1.000. The Bartlett-Box test for univariate homogeneity of variance was performed on the pre-test and post-test scores of Groups one and two on all five subscales of the MAQ and reported in Table 14. No significant difference was detected between the two groups in terms of univariate homogeneity. The analysis of co-variance of each MAQ subscale pre-test and post-test are reported in Tables 15 through 19.

Table 14

Bartlett-Box Test for Univariate Homogeneity for MAQ Pre-test and Post-test Subscales One through Five

Bartlett-Box value:	Pre-test	Post-test
Subscale:		
Subscale 1	2.88658 (p = .089)	1.79778 (p = .180)
Subscale 2	.00045 (p = .983)	.01272 (p = .910)
Subscale 3	.10602 (p = .745)	.16770 (p = .682)
Subscale 4	.15691 (p = .692)	.76190 (p = .383)
Subscale 5	.06777 (p = .795)	.00003 (p = .996)

Table 15

Analysis of Covariance of Groups One and Two on MAQ Post-test Subscale One Scores with Pre-test MAQ Subscale One Scores as Covariate

Source of Variation	Sums of Squares	DF	Mean Squares	F	Sig. of F
Within cells	6.18	29	.21		
Regression	11.02	1	11.02	51.74	.000*
Group	.07	1	.07	.35	.559

* significant, $p < .01$

Table 16

Analysis of Covariance of Groups One and Two on MAQ Post-test Subscale Two Scores with Pre-test MAQ Subscale Two Scores as Covariate

Source of Variation	Sums of Squares	DF	Mean Squares	F	Sig. of F
Within cells	19.19	29	.66		
Regression	9.08	1	9.08	13.72	.001*
Group	.06	1	.06	.09	.766

* significant, $p < .01$

Table 17

Analysis of Covariance of Groups One and Two on MAQ Post-test Subscale Three Scores with Pre-test MAQ Subscale Three Scores as Covariate

Source of Variation	Sums of Squares	DF	Mean Squares	F	Sig. of F
Within cells	18.65	29	.64		
Regression	13.79	1	13.79	21.45	.000*
Group	.68	1	.68	1.05	.313

* significant, $p < .01$

Table 18

Analysis of Covariance of Groups One and Two on MAQ Post-test Subscale Four Scores with Pre-test MAQ Subscale Four Scores as Covariate

Source of Variation	Sums of Squares	DF	Mean Squares	F	Sig. of F
Within cells	13.99	29	.48		
Regression	10.68	1	10.68	22.14	.000*
Group	.06	1	.06	.13	.726

* significant, $p < .01$

Table 19

Analysis of Covariance of Groups One and Two on MAQ Post-test Subscale Five Scores with Pre-test MAQ Subscale Five Scores as Covariate

Source of Variation	Sums of Squares	DF	Mean Squares	F	Sig. of F
Within cells	9.35	29	.32		
Regression	6.20	1	6.20	19.23	.000*
Group	.03	1	.03	.11	.748

* significant, $p < .01$

The null hypothesis five (there is no significant difference in pre- and post-treatment menstrual attitudes in women who receive analgesic treatment

as measured by the MAQ) and the null hypothesis six (there is no significant difference in pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ) were supported. Neither group reported a difference in attitude toward menstruation after treatment as compared to pre-treatment responses. The Bartlett-Box values for univariate homogeneity demonstrated no significant difference between the two groups on all five subscales on both the pre-test and the post-test. The significant regression effect on each pre-test MAQ subscale on the post-test MAQ subscale (Subscale one, p = .000, Subscale 2, p = .001, Subscale 3, p = .000, Subscale 4, p = .000, and Subscale 5, p = .000) demonstrate that the effect of the covariate, the pre-test score, is significantly related to the post-test score. There was no significant group effect (Subscale one, p = .559, Subscale 2, p = .766, Subscale 3, p = .313, Subscale 4, p = .726, and Subscale 5, p = .748) meaning that there was no significant difference between the groups on the post-test MAQ scores when controlling for differences in the pre-test MAQ scores.

Hypothesis seven

The null hypothesis seven (there is no significant difference in number of times analgesics used among women who receive acupressure treatment and women who receive analgesic treatment) was tested using analysis of variance of the monthly average number of times analgesics were taken. Hypothesis seven was supported; there was no difference in number of times analgesics were used among women who used acupressure and then took analgesics as needed and women who only took analgesics. The total number of times analgesics were

taken per day of each menstrual cycle were summed and divided by the number of days in that particular period for a monthly mean number of times analgesics used per day. The means and standard deviations of average number of times analgesics taken per day for groups one and two are listed in Table 20. This did not take into account the drug or dosage taken. Bartlett-Box tests of univariate homogeneity of variance were performed on the average number of times analgesics taken each month for both groups and are reported with Table 20. The summary of the repeated measures analysis of variance of both groups' average number of times analgesics taken are reported in Table 21.

Table 20

Mean and Standard Deviation of Average Number of Times Analgesics Taken by Month

Group	Number	Month 1 Mean	Month 1 S.D.	Month 2 Mean	Month 2 S.D.	Month 3 Mean	Month 3 S.D.
1	10	.187	.221	.257	.370	.237	.404
2	18	.456	.445	.439	.537	.349	.509
Both	28	.360	.398	.374	.485	.309	.470

The Bartlett-Box F value	Month 1 = 4.57858 (p = .033)*	Month 2 = 1.43002 (p = .232)	Month 3 = .57909 (p = .447)

* significant, $p < .05$

Table 21

Summary of Repeated Measures Analysis of Variance of Average Number of Times Analgesics Taken for Groups One and Two

Source	Sum of Squares	df	Mean Squares	F Ratio	Significance of F
Group	.68	1	.68	1.38	.251
within cells	12.88	26	.50		
Month	.04	2	.02	.34	.710
within cells	2.94	52	.06		
Group by month	.08	2	.04	.70	.501

The null hypothesis seven, there is no significant difference in analgesic use among women who receive acupressure and women who receive analgesic treatment was supported. No significant difference was found between the two groups on the average daily number of times analgesics taken regardless of the month. There was no demonstrated month by group interaction. Group one had lower means of number of times analgesics taken for each month but this difference was not found to be significant. The Bartlett-Box test for Univariate Homogeneity demonstrated a significant difference in homogeneity in the number of times analgesics taken during month one. The subjects in group one took less analgesics than those in group two. The Bartlett-Box test showed no significance in homogeneity between the two groups on the number of analgesics taken during months two and three of the study.

Other Findings

The number of times acupressure was used for dysmenorrhea in Group one was compared to the number of times analgesics were taken in Group two, using repeated measures analysis of variance, to investigate if one group was more prone to make interventions for dysmenorrheic pain than the other group. The means and standard deviations of average number of dysmenorrheic pain interventions by month for the two groups are reported in Table 22. The summary of repeated measures analysis of variance of average number of dysmenorrheic pain interventions for groups one and two are reported in Table 23.

Table 22

Mean and Standard Deviation of Average Number of Dysmenorrheic Pain Interventions by Month

Group	Number	Month One Mean	Month One S.D.	Month Two Mean	Month Two S.D.	Month Three Mean	Month Three S.D.
One	9	.665	.392	.557	.445	.589	.362
Two	18	.456	.445	.439	.537	.349	.509
Both	27	.526	.432	.478	.502	.429	.473
The Bartlett-Box F value		Month one = .16115 (p = .688)		Month two = .34925 (p = .555)		Month three = 1.09921 (p = .295)	

Table 23

Summary of Repeated Measures Analysis of Variance of Average Number of Dysmenorrheic Pain Interventions for Groups One and Two

Source	Sum of Squares	df	Mean Squares	F Ratio	Significance of F
Group	.64	1	.64	1.19	.285
within cells	13.42	25	.54		
Month	.10	2	.05	.84	.439
within cells	3.12	50	.06		
Group by month	.05	2	.02	.39	.681

No significant difference was found between the two groups on the average daily number of pain interventions regardless of the month. There was no significant difference found in any one month and there was no significant group by month interaction.

Analgesics and their dosages reported as taken by subjects in group one were: Aspirin 650 mg., Advil 400 mg., Anacin 650 mg., Anacin extra strength 2, Ibuprofen 400 mg. & 600 mg., Anaprox 550 mg., and Acetaminophen 325 mg. & 1000mg. Analgesics and their dosages reported as taken by the subjects in group two were Acetaminophen 650 mg. & 1000 mg., Ibuprofen 200 mg., 400 mg., 600 mg., & 800 mg., Midol 1000 mg. & 1500 mg., Maximum strength Midol X 2, Ponstel 250 mg. & 500 mg., Pamprin X 2, Vicodin X 1, Anaprox X 1, Aspirin 650 mg.

A multivariate analysis of variance was performed comparing the information obtained from the non-completers, i. e. demographic data and the

MAQ pre-test to the same information obtained from subjects who completed the study. The assumptions of multivariate analysis of variance are: random sampling, normal distribution, equal variances across the groups on the dependent variable, and a multivariate normal distribution with the same covariance matrix in each group (Munro & Page, 1993). Thirty-one of the completers and twenty-seven of the non-completers had complete data for age, years of college education, and number of children given birth to. The means and standard deviations of age, years of college education, and number of children given birth to for the completers and non-completers are reported in Tables 24, 25, and 26 respectively. The results of the multivariate analysis of variance are reported in Table 27.

Table 24

Mean and Standard Deviation of Age Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	29.452	7.758	31
Non-completers	28.370	10.613	27
Both groups	28.948	9.130	58

The Bartlett-Box F value is 2.68283 (p = .102).

Table 25

Mean and Standard Deviation of Years of College Education Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	3.613	2.459	31
Non-completers	2.407	1.551	27
Both groups	3.052	2.156	58

The Bartlett-Box F value is 5.50711 (p= .019)*.

* significant, $p < .05$

Table 26

Mean and Standard Deviation of Number of Children Given Birth to of Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	1.097	1.350	31
Non-completers	1.037	1.224	27
Both groups	1.069	1.282	58

The Bartlett-Box F value is .26203 (p = .609).

Table 27

Analysis of Variance of Age, Years of College Education, and Number of Children Given Birth to of Completers and Non-completers

Variable	Hypoth. Sum of Squares	Error Sum of Squares	Hypoth. Mean Squares	Error Mean Squares	F	Sig. of F
Age	16.87111	4733.97372	16.87111	84.53524	.19957	.657
Years of College	20.97147	243.87336	20.97147	4.35488	4.81562	.032*
Number of Children Given Birth to	.05150	93.67264	.05150	1.67273	.03079	.861

* significant, $p < .05$

There was a significant difference ($F = 4.81562$, $p = .032$) demonstrated in the number of years of college education obtained by the completers and non-completers, however the assumption of homogeneity of variance was violated as observed by the significant Bartlett-Box F value ($F = 5.50711$ $p = .019$). No significant difference was noted between the two groups in terms of age ($F = .19957$, $p = .657$) or number of children given birth to ($F = .03079$, $p = .861$). The means and standard deviation of the five pre-test MAQ subscales are reported in Tables 28 through 32. The analysis of variance of the five pre-test MAQ subscale scores for the completers and non-completers are presented in Table 33.

Table 28

Mean and Standard Deviation Pre-test MAQ Subscale One "Menstruation as a debilitating event" Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	4.255	.951	32
Non-completers	4.307	.909	28
Both groups	4.279	.924	60

The Bartlett-Box F value is .05812 (p = .810).

Table 29

Mean and Standard Deviation Pre-test MAQ Subscale Two "Menstruation as a bothersome event" Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	5.089	.763	32
Non-completers	5.042	.729	28
Both groups	5.067	.742	60

The Bartlett-Box F value is .05762 (p= .810).

Table 30

Mean and Standard Deviation Pre-test MAQ Subscale Three "Menstruation as a natural event" Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	4.869	.856	32
Non-completers	4.604	1.154	28
Both groups	4.745	1.006	60

The Bartlett-Box F value is 2.54201 (p = .111).

Table 31

Mean and Standard Deviation Pre-test MAQ Subscale Four "Anticipation and prediction of the onset of menstruation" Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	5.988	.1.020	32
Non-completers	5.848	.703	28
Both groups	5.923	.882	60

The Bartlett-Box F value is 3.76567 (p = .052).

Table 32

Mean and Standard Deviation Pre-test MAQ Subscale Five "Denial of any effect of menstruation" Completers and Non-completers

Group	Mean	Standard Deviation	N
Completers	2.174	.900	32
Non-completers	2.362	.675	28
Both groups	2.262	.802	60

The Bartlett-Box F value is 2.29150 (p = .130).

Table 33

Analysis of Variance of Pre-test MAQ Subscale Scores of Completers and Non-completers

Variable	Hypoth. Sum of Squares	Error Sum of Squares	Hypoth. Mean Squares	Error Mean Squares	F	Sig. of F
Pre-test MAQ Subscale 1	.03936	50.34710	.03936	.86805	.04534	.832
Pre-test MAQ Subscale 2	.03281	32.42274	.03281	.55901	.05870	.809
Pre-test MAQ Subscale 3	1. 05011	58.65839	1.05011	1.031135	1.03832	.312
Pre-test MAQ Subscale 4	.28971	45.59241	.28971	.78608	.36856	.546
Pre-test MAQ Subscale 5	.52858	37.43742	.5288	.64547	.81890	.369

No significant difference was found between the completers and non-completers related to any of the five of the MAQ subscales (Subscale one, F = .04534, p = .832; Subscale two, F = .05870, p = .809, Subscale three, F = 1.03832, p = .312; Subscale four F = .36856, p = .546; and Subscale five, F = .81890, p = .369) of the pre-test. A Pearson Correlation coefficient on the Chi square values for the answer yes to the question of whether or not pathology is present yielded

significant results. The subjects who completed the study reported a significantly higher presence of pathology than those who failed to complete the study (p = .026).

Summary of Findings

The findings of the study were:

1. There was a significant difference in pre-treatment dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment. The women in the group that received acupressure treatment reported higher levels of dysmenorrheic pain before any pain interventions were taken as compared to the women in the group that received analgesic treatment.

2. There was a significant difference in post-treatment dysmenorrheic pain among women who receive acupressure treatment as compared to women who received analgesic treatment. The women who received acupressure reported significantly higher levels of pain after acupressure than the women who received analgesics reported after analgesic use.

3. There was no significant difference in post-analgesic dysmenorrheic pain among women who receive acupressure treatment and women who receive analgesic treatment. After the women in the acupressure treatment group took analgesics there was no significant difference between their reported pain levels and those of the women of the analgesic group after they took analgesics.

4. There was a significant difference in pre-treatment and post-treatment dysmenorrheic pain among women who took analgesics. These

women reported significantly lower levels of pain after analgesic use as compared to pre-analgesic pain levels.

5. There was a significant difference in pre-treatment and post-treatment dysmenorrheic pain levels among women who receive acupressure treatment. The women who used acupressure for dysmenorrheic pain reported significantly lower post-acupressure pain levels as compared to pre-acupressure pain levels.

6. There was no significant difference in pre- and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ.

7. There was no significant difference in pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ.

8. There was no significant difference in the number of times analgesics were used between the women who received acupressure treatment and the women who receive analgesic treatment.

9. The women who completed the study reported more menstrual related pathology as compared to the women who failed to complete the study. Statistical significance was found upon analysis of variance in the number of years of college completed for completers and non-completers although the assumption of homogeneity of variance was violated.

CHAPTER FIVE

SUMMARY OF THE STUDY

A summary of the study is presented in this chapter. The results of the data analysis are reviewed, findings are presented, and conclusions are presented. Implications for nursing practice and recommendations for further study are presented.

Summary

The investigation was conducted to study the effects of self-applied acupressure to a point on the hand between the index finger and thumb on dysmenorrhea. The investigation utilized a quasi-experimental pre-test/post-test control group design approach to the study of the effects of acupressure on dysmenorrhea. Seven hypotheses related to comparing dysmenorrheic pain relief from acupressure to the dysmenorrheic pain relief obtained from analgesic use, the effect of analgesics on dysmenorrheic pain, the effect of acupressure on dysmenorrheic pain, the effect of analgesic use on menstrual attitudes, and the effect of acupressure use on menstrual attitudes.

The null hypotheses were:

1a. There is no significant difference in pre-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment.

1b. There is no significant difference in post-treatment dysmenorrheic pain between women who use acupressure treatment and women who use only analgesic treatment.

2. There is no significant difference in pre-treatment and post-treatment dysmenorrheic pain between women who receive analgesics.

3. There is no significant difference in pre-treatment and post-treatment dysmenorrheic pain between women who receive acupressure.

4. There is no significant difference in post-analgesic dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment.

5. There is no significant difference between pre- and post-treatment menstrual attitudes in women who receive analgesic treatment as measured by the MAQ.

6. There is no significant difference between pre- and post-treatment menstrual attitudes in women who receive acupressure treatment as measured by the MAQ.

7. There is no significant difference in analgesic use between women who use acupressure treatment first then analgesics as needed and women who receive analgesic treatment.

The study was based on the Gate Control Theory of pain. The Gate Control Theory of pain seeks to explain and predict the phenomenon of pain perception as well as give guidance for pain relieving interventions. Pain relief resulting from acupuncture/acupressure therapy is explained by the stimulation of a "central biasing mechanism" which can block the ascension of pain impulses to the brain. Another explanation given for the effect of analgesia produced by acupuncture/acupressure involves endorphins or

endogenous opiates which have been found in elevated levels following acupuncture treatment.

A review of the literature revealed very little published data about acupressure use. Acupuncture treatment for pain and various disorders is well-documented many times in the literature. A search of nursing literature revealed one published research study on acupressure use for morning sickness and several non-research articles on acupressure.

Sixty subjects were admitted to the study with thirty in the control group and thirty in the experimental group. All subjects completed the Menstrual Attitudes Questionnaire (MAQ) upon admission to the study. Subjects in the control group were given diaries with which to record the dates of their next three menstrual cycles, analgesic use for dysmenorrhea, and a pre- and post-analgesic use pain level using the 0-5 Present Pain Intensity (PPI) scale. Subjects in the experimental group were taught the acupressure technique to use in the presence of menstrual pain. They were told to record pain levels immediately before and after the acupressure technique using the PPI scale. If adequate pain relief was not obtained, they were instructed to take analgesics as they normally would. They were asked to record analgesic use as well as a post-analgesic pain level. The diaries were collected after each subject had experienced three menstrual cycles. All subjects then completed the MAQ a second time. The test items in the MAQ are grouped into five categories, Subscale one is "Menstruation as a debilitating event," Subscale two is "Menstruation as a bothersome event," Subscale three is "Menstruation as a

natural event," Subscale four is "Anticipation and prediction of the onset of menstruation," and Subscale five is "Denial of any effect of menstruation."

Repeated measures analysis of variance was used to compare the pre-treatment and post-treatment pain levels in the experimental and control groups. The treatment consisted of analgesic use in the control group and acupressure use in the experimental group. Repeated measures analysis of variance was also used to compare post-analgesic pain levels in both groups. Scores were tallied on the five factors or subscales included in the MAQ, menstruation as a debilitating event, menstruation as a bothersome event, menstruation as a natural event, anticipation and prediction of the onset of menstruation, and denial of any effect of menstruation. Analysis of covariance was used to compare pre- and post-MAQ scores on these five factors. The average daily number of times acupressure was used by the subjects in the experimental group per month was compared to the average daily number of time the subjects in the control group took analgesics per month using repeated measures analysis of variance. The average daily number of times analgesics were used by the subjects in the both groups each month were compared using repeated measures analysis of variance. Analysis of variance was used to compare the age, number of years of college, completed and number of children given birth to, of the women who completed the study and the women who did not. Analysis of variance was used to compare the five subscales of the MAQ pre-test of the completers with the non-completers.

Discussion of the Findings

Demographics

Sixty women began this study and thirty-two completed the study. The subjects were obtained by convenience sampling at one university, one junior college, and one elementary school. The youngest subject was 20 years old and the oldest 48 years old. The mean age in the experimental group was 31.67 years. The mean age in the experimental group was 28.15 years. All of the study participants had completed high school, were enrolled in college or had college credits. The mean number of years of college completed by the subjects in group one was 4.5. The mean number of years of college completed by the subjects in group two was 3.05. The parity of the subjects ranged from 0 to 5. Fifty per cent of the subjects in group one had not given birth and the remaining fifty per cent had given birth to at least one child. The nulliparous women in group two comprised 45.0% of the sample. The subjects were asked on the demographic data sheet if they had had a pelvic examination by a nurse or doctor in the previous two years. This question was answered affirmatively by 83.3% of the subjects in group one and 81.3% of the subjects in group two. Diagnosed pathology was reported by 33.3% of the subjects in group one and 45.0% of the subjects in group two. Uterine fibroids, enlarged uterus, abnormal uterine position, endometriosis, and ovarian cyst were among the pathologic conditions reported by the subjects. Some of the subjects reported the existence of more than one of these conditions. One subject was reported to be menopausal. This subject completed only two menstrual cycles during the study since a third period had not occurred at the

end of the study. One subject in the experimental group reported a history of a left salpingoophorectomy. Irregular menstrual cycles were reported by one subject in the experimental group and two subjects in the control group.

Summary Statistics

Hypotheses 1a and 1b

Repeated measures analysis of variance was used to compare pre-treatment and post-treatment pain levels of the control group with pre-treatment and post-treatment pain levels of the experimental group. The null hypothesis 1a, there is no significant difference in pre-treatment dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment, and the null hypothesis 1b, there is no significant difference in post-treatment dysmenorrheic pain between women who receive acupressure treatment and women who receive analgesic treatment were not supported by repeated measures analysis of variance. The experimental group experienced significantly higher pre-treatment pain and post-treatment pain levels than the control group regardless of the month (p = .039). The Bartlett-Box test for homogeneity demonstrates homogeneity between the two groups' pre-treatment and post-treatment pain scores on all three months of the study.

Hypotheses Two and Three

The null hypothesis two, there will be no significant difference in pre- and post-treatment dysmenorrheic pain levels in women who use analgesics and the null hypothesis three, there is no significant difference in pre-treatment and post-treatment dysmenorrheic pain levels in women who use

acupressure were not supported by repeated measures analysis of variance. The assumption of compound symmetry was violated so an epsilon correction factor was used. A significant difference in pre-treatment and post-treatment dysmenorrheic pain levels was demonstrated regardless of the month or group. Both groups had a significant difference between the pre-treatment and post-treatment pain scores (p = .001).

Hypothesis Four

The null hypothesis four, there is no significant difference in post-analgesic dysmenorrheic pain between women who use acupressure treatment and women who use analgesic treatment was supported. Repeated measures analysis of variance was used to compare the pre-analgesic and post-analgesic pain scores of the two groups. There was no significant group difference between pre-analgesic and post-analgesic scores. No significant month difference or group by month interaction was demonstrated. The test interaction was significant (p = .000). This illustrated that both groups had significant pain relief with analgesic use. No significant group by test, month by test or group by month by test effect was noted.

Hypotheses Five and Six

The null hypothesis five, stating there is no significant difference in pre-test and post-test menstrual attitudes in women using analgesics as measured by the MAQ, and the null hypothesis six, stating there is no significant difference in pre-test and post-test menstrual attitudes as measured by the MAQ were supported. Analysis of covariance was performed on the two groups' five subscales of the post-test MAQ. Each of the five pre-test subscales

served as the covariate for the analysis of the two groups' five post-test MAQ subscales. No significant group difference was demonstrated. The Bartlett-Box values for univariate homogeneity demonstrated no significant difference between the two groups on all five of the pre-test/post-test MAQ subscales.

Hypothesis Seven

The null hypothesis seven, there is no significant difference in analgesic use between women who receive acupressure treatment and women who receive analgesic treatment was tested using analysis of variance. There was no significant difference in the number of times per day analgesics were used between the two groups. The acupressure group had a lower mean value for all three months but this was not found to be significant. The Bartlett-Box test for univariate homogeneity demonstrated a significant difference in homogeneity in the number of times per day analgesics were taken during the first month of the study. The Bartlett-Box test showed no significant difference in homogeneity in the number of times analgesics were taken by the two groups during the other two months of the study.

Additional Findings

The number of times acupressure was used for dysmenorrhea by group one was compared to the number of times analgesics were used by group two to investigate if one group were more prone to take interventions for dysmenorrhea than the other group. No significant difference was found between the two groups on the average daily number of pain interventions using repeated measures analysis of variance.

Analgesics and their dosages reported as taken by subjects in group one were: Aspirin 650 mg., Advil 400 mg., Anacin 650 mg., Anacin extra strength 2, Ibuprofen 400 mg. & 600 mg., Anaprox 550 mg., and Acetaminophen 325 mg. & 1000mg. Analgesics and their dosages reported as taken by the subjects in group two were Acetaminophen 650 mg. & 1000 mg., Ibuprofen 200 mg., 400 mg., 600 mg., & 800 mg., Midol 1000 mg. & 1500 mg., Maximum strength Midol X 2, Ponstel 250 mg. & 500 mg., Pamprin X 2, Vicodin X 1, Anaprox X 1, Aspirin 650 mg.

Analysis of variance was performed comparing the information obtained by women who failed to complete the study with the women who completed the study. No significant difference was found between the completers on age, number of children given birth to or on any of the five subscales of the MAQ pre-test. A significant difference was reported in the number of years of college completed, but on inspection of the Bartlett-Box value, it was noted that the assumptions underlying ANOVA were violated. A Pearson Correlation coefficient on the Chi square values for the answer yes to me question of whether or not pathology is present yielded significant results. The subjects who completed the study reported a significantly higher presence of pathology than those who failed to complete the study (p = .026).

Discussion of the Findings

This section discusses the findings of the study. It explores possible relationships between the use of acupressure and dysmenorrhea. Possible reasons for differences among the groups are discussed.

The Relationship Between Pre-treatment Dysmenorrheic Pain Levels in the Control Group and Experimental Group

A significant difference was found between the pre-treatment pain levels in the control group and experimental group regardless of the month of the study. This was an unexpected finding due to the fact that subjects from both groups were obtained from the same sample and assigned to either the control group or experimental group by odd and even numbering. Group one had lower incidence of reported pathology (33.3%) as opposed to group two (47.4%). There was a difference in the level of dysmenorrheic pain between the two groups before any intervention took place.

The Relationship Between Post-treatment Dysmenorrhea Pain Levels in the Control Group and Experimental Group

A significant difference was found between the post-treatment dysmenorrheic pain levels in the two groups. The treatment consisted of acupressure for the experimental group and analgesics for the control group. One explanation would be that the experimental group had a higher level of pain before the intervention as discussed in the previous paragraph. Another explanation would be that the acupressure technique is simply not as effective in reducing dysmenorrhea pain as analgesics.

The Relationship Between Pre-treatment and Post-treatment Pain Levels in the Control Group

A significant difference was found between the pre-treatment and post-treatment pain levels in the subjects of the control group. The treatment consisted of analgesics. This was not a surprising finding since it is in

congruence with the literature and popular knowledge that analgesics reduce pain. Three of the four non-steroidal anti-inflammatory agents (NSAIDs) recommended in the literature for dysmenorrhea (Khoiny, 1988) were taken by subjects in this study. Ibuprofen, mefenamic acid, and naproxen sodium were reported as taken by subjects. It is interesting to note that aspirin was reported as taken by several subjects for dysmenorrheic pain although the literature states that it is of little value in the treatment of dysmenorrhea (Tolman, McGuire, & Rosenthale, 1985).

The Relationship Between Pre-treatment and Post-treatment Pain Levels in the Experimental Group

Acupressure was found to provide a significant decrease in dysmenorrheic pain. There are no published studies regarding the use of acupressure for dysmenorrhea. Acupressure has been found to be effective in the treatment of morning sickness (Hyde, 1989). Several reports of the successful treatment of dysmenorrhea with acupuncture are documented in the literature (Helms, 1987; Zhang, 1984; & Steinberger, 1981). Ultrasound therapy on acupuncture sites was found to be effective against dysmenorrhea by Rossman, Wexler, & Oyle (1974). Two research studies demonstrated a relief in dysmenorrhea by the use of Transcutaneous Electrical Nerve Stimulation (TENS) (Santiesteban, Burnham, George, Kita, Mehring, 1985; & Mannheimer & Whalen, 1985).

The subjects in the experimental group recorded post-treatment pain levels immediately following use of the acupressure technique. The subjects in the control group recorded post-treatment pain levels thirty minutes after

ingestion of analgesics. The subjects in the acupressure group experienced pain reductions in a shorter period of time than those in the control group.

The mortality of the subjects was a major problem of this study. The subjects in group one who dropped out of the study may have experienced less pain relief than the subjects who remained in the study. If this is the case, and had these subjects completed the study, the pain relief obtained by acupressure may have not have been significant. Reasons given in the literature why acupressure does not always produce analgesia are:

1) Missing the target.
2) Not enough pressure applied.
3) Stopping the pressure before fifteen to thirty seconds have elapsed.
4) Avoiding repeat treatments.
5) Panic that acupressure fails to provide 100% relief.
6) Conditioned response - "If I don't take pills, I will hurt."
7) Changing medical condition - a new medical condition may have arisen.
8) Psychological stresses
9) Secondary gains from the pain (Kurland, 1877).

Offering the subjects something of value or a chance at a drawing for something of value upon completion of a study may have reduced the the high mortality rate in this study.

Perhaps a more profound analgesic effect would have been detected if the study had progressed for a longer period of time. A downward trend in pain levels was demonstrated across the three month period of study.

The Relationship Between Post-analgesic Pain Levels in the Experimental and Control Groups

No significant difference in pain levels was found between the two groups after both groups had taken analgesics. This is in congruence with the literature reports of the efficacy of analgesics, particularly NSAIDs against dysmenorrhea (Khoiny, 1988; & Tolman, McGuire, & Rosenthale, 1985).

The Relationship Between Pre-test and Post-test Menstrual Attitudes in the Control Group and the Experimental Group

No significant difference was found between the pre-test and post-test MAQ in the control group or the experimental group. The five subscales were: Subscale One is "Menstruation as a debilitating event," Subscale two is "Menstruation as a bothersome event," Subscale three, "Menstruation as a natural event, " Subscale four, "Anticipation and prediction of the onset of menstruation, " and Subscale five, "Denial of any effect of menstruation." Melzack (1973) proposes that when an individual experiences a greater control over the source of the pain, that individual's attitude toward the source of the pain becomes more positive. The subjects in group two dealt with their dysmenorrheic pain in the usual manner and were not expected by the researcher to exhibit a change in attitude toward menstruation. The subjects in group one who used a new strategy for dealing with dysmenorrhea also failed to demonstrate a change in attitude toward menstruation. Perhaps the pain relieving properties of acupressure were not profound enough to give the subjects in group one an increased feeling of control over dysmenorrhea.

The Relationship of Analgesic Use Between the Experimental Group and Control Group

No significant difference was found between the number of times the subjects in the experimental group and the control group used analgesics for dysmenorrhea. The experimental group had a lower mean number of times analgesics were used per day for each month but this was not significant. Perhaps if there had been more subjects, this difference may have been significant.

Relationship Between Number of Pain Interventions for Dysmenorrhea

No significant difference was found when the number of times analgesics were taken by the control group compared to the number of times the subjects in the experimental group used acupressure. Neither group seemed more prone than the other to take interventions for dysmenorrhea.

Relationship Between Completers and Non-completers

No significant difference was found between the women who completed the study and the women who failed to complete the study in the areas of age, number of children given birth to, years of college completed, or the five subscales of the MAQ. The subjects who completed the study reported a greater incidence of pathology. Perhaps the subjects who completed the study had a higher motivation to complete the study due to a greater incidence of menstrual-related pathology.

Conclusions

1. Acupressure may be of some value in the treatment of dysmenorrhea.

2. The pain relieving effects of acupressure may not be as profound as the pain relieving effects of analgesics.

3. Acupressure provided quicker pain relief than analgesics. It may be of value in controlling dysmenorrhea until ingested analgesics take effect.

4. The use of acupressure for dysmenorrhea appears to have no effect on the amount of analgesic use.

5. The use of acupressure appears to have no effect on attitude toward menstruation.

Implications

After more research in this area, acupressure may be found to be of benefit in the treatment of dysmenorrhea. Women who dislike the use of analgesics would be particularly suited for this treatment.

Recommendations for Future Research

1. Replication of the study should be done with a larger sample size and using subjects with a more diverse educational background.

2. Replication of the study using a longer time frame.

3. A comparison of how quickly acupressure provides pain relief as opposed to analgesic use should be studied as well as duration of pain relief.

4. A comparison of the analgesic effects of acupressure applied to a placebo point and to a traditional acupuncture point should be studied.

5. A comparison of acupressure to other non-pharmacological methods of pain relief such as relaxation, guided imagery, or hot and cold therapy should be studied.

6. A comparison of the pain relieving effects of acupressure for primary and secondary dysmenorrhea should be studied.

Summary

This study suggests that the use of a self-applied acupressure technique could provide significant pain relief from dysmenorrhea. Acupressure is not in wide use at this time and there is very little in the literature concerning acupressure. Dysmenorrhea is a prevalent problem among child-bearing women and perhaps this acupressure technique would have usefulness in the fight against dysmenorrhea.

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APPENDIX A

Demographic Data Instrument

Demographic Information

Age _____ Grades of High School Completed _____

Years of College Completed _____

Number of children you have given birth to _____

Have you had a pelvic examination by a doctor or nurse within the last two years? _____

Check the appropriate spaces if you have been told you have any of the gynecological disorders listed below:

_____ abnormal positioning of the uterus

_____ fibroid tumors (benign tumors of the uterus)

_____ endometriosis (cells of the uterine lining which have implanted outside of the uterus

_____ pelvic inflammatory disease (PID)

_____ cervical stenosis (narrowing of the cervical opening to the uterus)

Do you have any other gynecological disorders not listed above?

If so, explain here:

APPENDIX B

Present Pain Intensity (PPI) Scale from the McGill Pain Questionnaire (MPQ)

The Present Pain Intensity (PPI) Scale from the McGill Pain Questionnaire is a copyrighted instrument For permission to use the PPI or MPQ contact:

Dr. Ronald Melzack, Professor
Department of Psychology, McGill University
1205 Docteur Penfield Avenue
Montreal, PQ, Canada H3A 1B1

McGill University

Department of Psychology
Stewart Biological Sciences Building

November 18, 1987

Ms. Debra S. Mahoney
Route 5, Box 164
Rusk, Texas, 75785
U. S. A.

Dear Ms. Mahoney:

It is a pleasure to give you permission to use the Present Pain Intensity scale from the McGill Pain Questionnaire.

You will also find enclosed, a notice that is now going out to users of the MPQ. As you will see, it involves an "honour system" of payment to the International Association for the Study of Pain.

Sincerely,

Ron Melzack 161

Ronald Melzack
Professor

Postal address: 1205 Docteur Penfield Avenue, Montreal, PQ, Canada H3A 1B1

APPENDIX C

The Menstrual Attitude Questionnaire (MAQ)

The Menstrual Attitude Questionnaire (MAQ)
is a copyrighted instrument
For permission to use the MAQ contact:

Dr. J. Brooks-Gunn, Senior Research Scientist
Educational Testing Service
Princeton, N.J. 08541

EDUCATIONAL TESTING SERVICE PRINCETON, N.J. 08541

609-921-9000
CABLE-EDUCTESTSVC

DIVISION OF
EDUCATION POLICY RESEARCH
AND SERVICES

Dear Researcher,

We have enclosed a copy of the Menstrual Attitude Questionnaire and a paper on the construction and development of the questionnaire. If you decide to use the Menstrual Attitude Questionnaire in your research, I would appreciate receiving a copy of any article or paper summarizing your findings since many researchers have expressed interest in the questionnaire. It is important to compare and contrast the results of different research groups who are investigating different samples of women.

Thank you and best of luck with your project.

Sincerely,

J. Brooks-Gunn

J. Brooks-Gunn
Senior Research Scientist

APPENDIX D

Consent Form for Subjects in
The Experimental Group

TEXAS WOMAN'S UNIVERSITY
HUMAN SUBJECTS REVIEW COMMITTEE

CONSENT FORM A (Written presentation to subject)

Consent to Act as a Subject for Research and Investigation:

The following information is to be read to or read by the subject. One copy of this form, signed and witnessed, must be given to each subject. A second copy must be retained by the investigator for filing with the Chairman of the Human Subjects Review Committee. A third copy may be made for the investigator's files.

1. I hereby authorize Debra Mahoney
(Name of person(s) who will perform procedure(s) or investigation(s))

to perform the following procedure(s) or investigation(s):
(Describe in detail) *Refer to page 8, Part II, Guidelines.*
I will complete the Menstrual Attitudes Questionnaire. I will be taught an acupressure technique consisting of applying pressure to the web between the thumb and index finger with the thumbnail and index finger of the opposite hand and then reversing the procedure in order to apply pressure to both hands. I will be given a pocket-sized diary to take with me to record data about my next three menstrual cycles. I will record the beginning and ending dates of my next three menstrual cycles. When menstrual pain occurs, I will use the acupressure technique and record the level of menstrual pain immediately before and after the acupressure technique using the 0-5 Present Pain Intensity scale in the diary. If the acupressure technique is ineffective in reducing menstrual pain and an analgesic is taken, I will record the name and dose of the analgesic as well as the time I take it. I will also record my pain level before taking the analgesic and thirty minutes afterward on the 0-5 Present Pain Intensity scale. After three menstrual cycles, I will return the diary to the researcher and complete the Menstrual Attitudes Questionnaire a second time. I understand I am free to withdraw from the study at any time.

2. The procedure or investigation listed in Paragraph 1 has been explained to me by Debra Mahoney
(Name)

3. (a) I understand that the procedures or investigations described in Paragraph 1 involve the following possible risks or discomforts:
(Describe in detail)

1. Possible bruising of the hands.

2. Unauthorized release of confidential information obtained in the study.

FORM A - Continuation

3. (b) I understand that the procedures and investigations described in Paragraph 1 have the following potential benefits to myself and/or others:

A decrease in menstrual pain.

3. (c) I understand that - No medical service or compensation is provided to subjects by the university as a result of injury from participation in research

4. An offer to answer all of my questions regarding the study has been made. If alternative procedures are more advantageous to me, they have been explained. A description of the possible attendant discomfort and risks reasonably expected have been discussed with me. I understand that I may terminate my participation in the study at any time.

_____ _____

Subject's Signature Date

If the subject is a minor, or otherwise unable to sign, complete the following:

Subject is a minor (age _____), or is unable to sign because:

Signatures (one requires)

_____ _____

Father Date

_____ _____

Mother Date

_____ _____

Guardian Date

_____ _____

Witness (one required) Date

APPENDIX E

Consent Form for Subjects in the Control Group

TEXAS WOMAN'S UNIVERSITY
HUMAN SUBJECTS REVIEW COMMITTEE

CONSENT FORM A (Written presentation to subject)

Consent to Act as a Subject for Research and Investigation:

The following information is to be read to or read by the subject. One copy of this form, signed and witnessed, must be given to each subject. A second copy must be retained by the investigator for filing with the Chairman of the Human Subjects Review Committee. A third copy may be made for the investigator's files.

1. I hereby authorize Debra Mahoney
(Name of person(s) who will perform procedure(s) or investigation(s))

to perform the following procedure(s) or investigation(s):
(Describe in detail) *Refer to page 8, Part II, Guidelines.*

I will complete the Menstrual Attitudes Questionnaire. I will be given a printed pocket diary to take with me to record data about my next three menstrual cycles. I will record the beginning and ending dates of my next three menstrual periods. I will record any analgesics I take for menstrual pain only, including the date, time, the name of the analgesic and the dose. I will also record the level of menstrual pain, before taking the analgesic and thirty minutes after taking the analgesic, on the 0-5 Present Pain Intensity scale in the diary. At the completion of the study, the diary will be turned into the researcher and I will complete the Menstrual Attitudes Questionnaire a second time. I understand I am free to withdraw from the study at any time.

2. The procedure or investigation listed in Paragraph 1 has been explained to me by Debra Mahoney
(Name)

3. (a) I understand that the procedures or investigations described in Paragraph 1 involve the following possible risks or discomforts: (Describe in detail)

1. Unauthorized release of confidential information obtained in the study.

FORM A - Continuation

3. (b) I understand that the procedures and investigations described in Paragraph 1 have the following potential benefits to myself and/or others: A decrease in menstrual pain. 152

3. (c) I understand that - No medical service or compensation is provided to subjects by the university as a result of injury from participation in research

4. An offer to answer all of my questions regarding the study has been made. If alternative procedures are more advantageous to me, they have been explained. A description of the possible attendant discomfort and risks reasonably expected have been discussed with me. I understand that I may terminate my participation in the study at any time.

_____ _____
Subject's Signature Date

If the subject is a minor, or otherwise unable to sign, complete the following:

Subject is a minor (age _____), or is unable to sign because:

Signatures (one requires)

_____ _____
Father Date

_____ _____
Mother Date

_____ _____
Guardian Date

_____ _____
Witness (one required) Date

APPENDIX F

Agency Approvals

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE AD Nursing Program of Tyler Junior College Tyler, TX

GRANTS TO Debra Mahoney

a student enrolled in a program of nursing leading to a Doctoral Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem.

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other _____

Date: 9/9/91

Signature of Agency Personnel

Signature of student

Signature of Faculty Advisor

* Fill out and sign three copies to be distributed as follows: Original - Student: First Copy - Agency; Second Copy - TWU College of Nursing.

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE University of Texas at Tyler - Division of Nursing

GRANTS TO Debra Mahoney

a student enrolled in a program of nursing leading to a Doctoral Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem.

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other _____

Date: March 25, 1992

Davis J. Rieman
Signature of Agency Personnel

Debbie Mahoney
Signature of student

Peggy J. Brown
Signature of Faculty Advisor

* Fill out and sign three copies to be distributed as follows: Original - Student: First Copy - Agency; Second Copy - TWU College of Nursing.

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Rusk Primary School Rusk, TX

GRANTS TO Debra Mahoney

a student enrolled in a program of nursing leading to a Doctoral Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem.

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other _____

Date: 5-30-92

Signature of Agency Personnel

Debbie Mahoney
Signature of student

Signature of Faculty Advisor

* Fill out and sign three copies to be distributed as follows: Original - Student: First Copy - Agency; Second Copy - TWU College of Nursing.

APPENDIX G

Human Subjects Review

TEXAS WOMAN'S UNIVERSITY
P.O. Box 22939, TWU Station
OFFICE OF RESEARCH & GRANTS ADMINISTRATION
DENTON, TEXAS 76204-0939

HUMAN SUBJECTS REVIEW COMMITTEE

Name of Investigator: Debra Mahoney Center: Denton

Address: Rt. 5, Box 239 Date: 6-19-91

Rusk, Texas 75785

Dear Debra Mahoney:

Your study entitled Acupressure and Its Use for Dysmenorrhea

has been reviewed by a committee of the Human Subjects Review Committee and appears to meet our requirements in regard to protection of individuals' rights.

Be reminded that both the University and the Department of Health, Education, and Welfare regulations typically require that signatures indicating informed consent be obtained from all human subjects in your study. These are to be filed with the Human Subjects Review Committee. Any exception to this requirement is noted below. Furthermore, according to DHEW regulations, another review by the Committee is required if your project changes.

Special provisions pertaining to your study are noted below:

___ The filing of signatures of subjects with the Human Subjects Review Committee is not required.

___ Other:

_X_ No special provisions apply.

Sincerely,

Chairman
Human Subjects Review
Committee at Denton

cc: Graduate School
Project Director
Director of School or
Chairman of Department

Revised 2/91

THE UNIVERSITY OF TEXAS AT TYLER
3900 UNIVERSITY BOULEVARD • TYLER, TEXAS 75701-6699 • (903) 566-7031

SCHOOL OF EDUCATION
AND PSYCHOLOGY

Department of
Health and Kinesiology

MEMORANDUM

TO: Debra Mahoney

FROM: James Schwane, Chairman
Human Subjects Investigation Committee

DATE: March 20, 1992

SUBJECT: Committee action re. Project #9192-007, "Acupressure and Its Use for Dysmenorrhea"

At its regularly scheduled meeting this morning, the Human Subjects Investigation Committee (HSIC) considered the materials you submitted on March 12 related to your proposed project titled "Acupressure and Its Use for Dysmenorrhea." The Committee approved the project, based primarily on the approvals previously granted at Texas Woman's University, especially that of the T.W.U. Human Subjects Review Committee. Therefore, you may proceed with the project as described in the materials submitted to the Human Subjects Investigation Committee.

Please be advised that any adverse effects resulting from the research that occur with any human subject must be immediately reported to the HSIC. Also, please note that a report of the project will be required upon completion; I will contact you about that later.

I wish you well in your research.

APPENDIX H

Graduate Studies and Research Approval

TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON
THE GRADUATE SCHOOL
P.O. Box 22479, Denton, Texas 76204-0479 817/898-3400

June 25, 1991

Ms. Debra Mahoney
Rt. 5, Box 164
Rusk, TX 75785

Dear Ms. Mahoney:

I have received and approved the Prospectus for your reserach project. Best wishes to you in the research and writing of your project.

Sincerely yours,

Leslie M Thompson

Leslie M. Thompson
Dean for Graduate Studies
and Research

dl

cc Dr. Peggy Drapo
Dr. Carolyn Gunning