

CHAPTER 2

LITERATURE REVIEW

In order to study the effects of using a yoga program during pregnancy on maternal comfort, labor pain, and birth outcomes; the literature review was conducted in relation to the major concepts of the study. These include yoga and health in pregnant women and the parturient, Kolcaba's theory of comfort: The application for parturient and pregnancy, the study variables, and the factors influencing the study variables. Theoretical and methodological considerations are also addressed.

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Yoga and Health in Pregnant Women and the Parturient

Within eastern traditions, health is seen as the state of balance and equilibrium of mind, body, and spirit (Iyengar, 1977). The word “*yoga*” comes from a Sanskrit root “*yuḥ*” that means to yoke, to join, and to direct and concentrate one’s attention. The goal of the ancient tradition of yoga is the stilling of the restlessness of the mind and the joining of the mind, body, and spirit in the search for health, self-awareness, and spiritual attunement (Myers, 1997). Based on yoga practice, it frees the physical limitations and restores balance to the body (Schiffmann, 1996). With the attention to correct physical alignment in postures, there is an important focus on body awareness; internal sensation and experience as it changes from moment to moment. By unifying the physical body, breath, and concentration while performing the postures, blockages in the energy channels of the body are cleared and the body energy system becomes more balanced. Consequently, the practitioner will overcome the body through the practice of *asanas* and make it a fit vehicle for the spirit (Iyengar, 1997).

The foundation of the yogic view of health is that the body and the mind are part of one continuum of existence, and the mind being more subtle than the body. It is believed that as the body and mind are brought into balance and health, the individual will be able to perceive their true nature and that will allow life to be lived more freely and spontaneously. Therefore, the overall goals of yoga are happiness, inner freedom, and optimal health, not merely physical fitness and the absence of disease. Yoga also offers a systematic ethical and spiritual path of consciousness transformation.

The Yoga-Sutra of Patanjali

Patanjali, an Indian sage living two millennia ago, described yoga as consisting of eight interconnected limbs or aspects of the whole that lead progressively to higher stages of health and awareness (Hartranft, 2003). These physical and psychological practices are believed to contribute to a higher level of personal development. The outer aspect of yoga consists of correct living (abstinence and personal discipline), correct care of the body (body control), and enhancement of vital energy (breath control). Yoga also has an inner dimension that is the key purpose of yoga. Detachment, concentration, and meditation together form a single process toward the development of pure consciousness (Frawley, 1997). The eight-fold paths of yoga are described as follows (Fontaine, 2000).

1. Abstinence (*yamas*) is about what not to do in life. *Nonviolence* (*ahimsa*) includes not physically hurting others, using nonviolent words, and having nonviolent thoughts. *Nonstealing* (*asteya*) includes not stealing others' material things as well as not taking credit for things one has not done, and not stealing the center of attention, and so forth. *Chastity* (*brahmacharya*), another abstinence, means holding people in high esteem and loving and respecting others. *Nongreed* (*aparigraha*) means living simply and viewing possessions merely as tools to use in life. Nongreed leads to the avoidance of jealousy and envy.

2. Personal disciplines (*niyamas*) are about what to do in life. Purity (*shauca*), the first discipline, is achieved through the practice of abstinence. Purity also relates to cleanliness and respect for all life. *Contentment* (*santosha*) means finding happiness with one who is and with what one has. Self-discipline (*tapas*) means the

ability to make a commitment and adhere to it. *Self-study (svadhyaya)* means studying oneself through introspection. *Centering on the divine (ishvara-pranidhana)* involves devotion. These disciplines work with any religion because individuals are encouraged to focus on the divine that is in them, is part of them, and is all around them.

3. Body control (*asanas*) or poses help people learn to control their bodies, making them stronger, more flexible, function, better and more resistant to disease and other problems. Body control is also meant to facilitate meditation.

4. Breath control (*pranayama*) teaches people to direct energy or *prana* for optimal physical and mental benefit. The purpose of achieving balance in breathing is to make respiratory rhythm more regular, which in turn has a soothing effect on the entire nervous system. It is the best antecedent to meditation, because it focuses attention inward and reduces scattered thinking.

5. Detachment (*pratyahara*) is the withdrawal of the senses from every thing that stimulates them. Thus the goal of detachment is to gain mastery over external influences.

6. Concentration (*dharana*) is to direct the mind so that it focuses on one thing instead of many.

7. Meditation (*dhyana*) is the process of clearing the mind of clutter and thus thinking more quickly and seeing things more clearly in daily life.

8. Pure concentration (*samadhi*) comes from the other seven limbs of yoga. It means a total merging with the object of meditation and, in this way, becoming one with the universe. Generally speaking, it is “mind without thought”.

Yogic View of Health and Illness

According to Niranjananda (1997) human beings are all subject to the influence of circumstances, events and the environment and each person needs to develop an awareness of how to interact with and react to situations. When they are unable to resolve the problems, whether environmental, social, personal or family, the effects are manifested in the form of illnesses, a patient is a sufferer. Therefore, a person has to learn how to cope and deal with these problems at various levels of the personality.

There is a link between the body, which means the human personality that is manifesting at present in life, and the consciousness, which is invisible, un-manifest and subtle. Consciousness is manifested throughout the body. It can be thought of as radio waves; when the body is in tune with consciousness, the projection of consciousness into the body will be harmonious. When the body is not tuned to consciousness, the signals will never be heard or seen. This is similar to what happens when consciousness interacts with the body in a very disturbed, distracted and dissipated way. Therefore, when consciousness is being manifested in the body and it is not tuned in properly, the body is going to react. This is the beginning of an illness, which is not a physical condition. It is, rather, a state of disharmony between the subtle nature and the gross nature; it is a state of imbalance between the consciousness and the body. In the yogic view, if human beings wish to experience health or well being, they have to approach their nature from different angles. They work with their body, but at the same time they have to work with their mind as well as with expressions of consciousness, which are filtering down into the mind and the body.

Consciousness has three major areas of expression. First, the intellectual represents 'the head' in relation to understanding, rationality and analysis of a situation, condition or event, and living harmoniously with the intellectual aspects of consciousness. Second, the emotion represents 'the heart' in relation to feelings, emotion, and sensitivity. When the heart is in disharmony, there is going to be a suppression of emotions and feelings. This is unnatural to the normal state of the body and mind, and when suppression happens a person is going to suffer. The clearing of blockages from the heart to the center leads to health. The instinctive is the third expression, which reacts instinctively to the many situations in life.

The concept of *chakras* in yoga gives an indication of how yoga views the three different expressions of consciousness in peoples' lives and bodies. *Chakras* are centers in the body where consciousness and energy are manifest in a particular form. There are seven psychic centers or *charkas* in the body. The first three centers, which are located respectively at the base of the spinal cord, in the sacral area, and behind the navel in the spinal cord, embody the instinctive dimensions of the personality, such as, fear, insecurity, sexuality, vitality, motivation and power. The two middle ones known as the heart center and the throat center, embodies the emotional aspect of human nature or feelings. The sixth *chakra*, known as the eyebrow center, embodies the higher mind. Lastly, the highest center, on the crown of the head, is the command center for all these different centers of consciousness and energy.

The development of knowledge in society and in the world is not the final indication of knowledge; it filters down from the consciousness into the lives of people. Knowledge and understanding, although they may be logical, precise and clear, are associated, connected and linked with the first three psychic centers, which

are instinctive. Thus it must be noted that all achievements in life have been in search of fulfillment, satisfaction, and pleasure.

The point to consider is how to find a balance between the instinctive, emotional, and intellectual natures. When they are balanced, then transmissions from the consciousness into the body will be more harmonious, balanced and integrated. Yoga attempts to clear the transmission passage, the transmitters of consciousness into the body. *Asana*, *pranayama*, and the relaxation techniques are used to induce different states of flexibility, comfort and ease in the physical, muscular, endocrine, and respiratory systems. Furthermore, the effects of these practices are continued at the subtle level.

Pratyahara is a way of clearing the transmissions and channels through which consciousness transmits into the physical dimension. *Pratyahara* is the beginning of introspection, or reflection, of experiencing silence, of going within and finding stability, and of finding the focus. It is also divided into the different stages of the focusing of consciousness or awareness. First, there is an extension of awareness into the sensory perceptions to know how they are affecting and altering the mind and the consciousness. Second, it is an extension of awareness into the mind, to know how the mind is interacting with situations, conditions and events that influence a person's life. Third, there is the extension of awareness into the emotional dimension, to realize and understand the nature of emotions, feelings and sensitivity. Fourth, it is the extension of awareness into the instinctive dimension. This focusing of awareness in each stage of *pratyahara* gradually trains the personal self to observe and analyze how that self is responding and reacting to different situations that might create an imbalance in the personality. Having observed the interactions of the consciousness with the senses,

the intellectual, the emotional, and the instinctive aspects, then there is the move to the next stage, *dharana*, or introspection. *Dharana* is holding the consciousness stable and identifying with the tranquil consciousness of meditation.

In conclusion, this process of self-observation, or self-understanding, leads to the experience of optimal health and well-being. Thus, yoga is a method of treating a person who is suffering from a condition by making them aware of their personality and how it is interacting in the world, at the external level, and with consciousness, at the subtle level. When people are able to do this, they find that their habits and their lifestyles change. In addition, they also find that their attitudes, perspectives, and visions change, and there is a feeling of completeness and wholeness. With this sense of wholeness, the journey into yoga begins. It is with this sense of wholeness that we move forward to experience life unfolding, growing, and evolving. Yoga gives hints and ideas on how we can manage our lives and become aware of these hints in order to improve the quality of the body, mind, and interactions. Improving the quality of the body and the mind leads to total health.

According to Nagendra (1997), disease or ill health is seen to arise through imbalance in any of the three lower sheaths of existence. The physical, *pranic*, mind sheaths and ego consciousness that centers on the self, predominates and harmony in these sheaths can be easily disturbed. The fourth and fifth sheaths cannot be so easily disturbed. When we are truly healthy, the positive energy in the highest sheath percolates freely through the lower ones and brings total harmony and balance to all our faculties. When the harmony of the higher sheaths is constant, the free movement of bliss can be blocked by imbalances in the lower sheaths. For example, a bad day at work may make a person irritable, and it also increases stress reactions, makes muscles

tense, and often depletes the energy level, leading to chronic fatigue. For this reason, yoga contains elements that address problems at every level: *asanas* that relax and tone muscles, and massage the internal organs; pranayama that slows breathing and regulates the flow of *prana*; relaxation and meditation that calm the mind and emotions, and produce equanimity. Negative influences spread disruption, but positive action has repercussions as well. The different types of yoga practice augment each other and are more effective when done together. Therefore, when doing the *asanas* and stretching muscles, muscular tension is eased and a person is able to relax easily. Likewise, when relaxing the mind and releasing suppressed emotions, a person tends to become less tense on the physical level. Every element of yoga brings benefits and also increases the effect of the other types of practices.

Many researchers have investigated the links between yoga and health or illness. Wood (1993) studied the effects of relaxation, visualization, and yogic breathing and stretching (*pranayama*) on perceptions of physical and mental energy, and on positive and negative mood states in a group of normal volunteers. Each of the three sub-groups attended six sessions over a two-week period. Pranayama produced a significantly greater increase in perceptions of mental and physical energy and feelings of alertness and enthusiasm than the other two procedures ($p < 0.5$). Relaxation made subjects significantly more sleepy and sluggish immediately after the session than did *pranayama* ($p < 0.5$). Visualization made them more sluggish but less content than *pranayama* ($p < 0.5$) and more upset than relaxation after the second session ($p < 0.5$). In conclusion, a 30-minute program of yogic stretch and breathing exercise, which is simple to learn and can be practiced even by the elderly, had a markedly 'invigorating'

effect on perceptions of both mental and physical energy and increased 'high positive' mood.

Kimura, Ohno, Kumano, and Kimura (2000) examined changes in brain waves and blood levels of serum cortisol during yoga exercise in seven yoga instructors, and found that alpha waves increased and serum cortisol decreased. These two measures were negatively correlated ($r = -.83$). Experiments started with 10 minutes of seat rest (rest period). During this rest period, the subjects were asked to keep their eyes open because they tended to go into a meditative state when the eyes were closed. Following the 10-minute rest were 15 minutes of physical yoga exercise or *asana*, 15 minutes of breathing exercise or *pranayama*, and then 20 minutes of meditation.

Garfinkel and colleagues studied the effectiveness of a yoga-based regimen for relieving symptoms of carpal tunnel syndrome. Forty-two individuals of carpal tunnel syndrome (CTS) were assigned into the yoga group and the control group. The yoga group receiving a yoga-based intervention consisting of 11 yoga postures specially designed for strengthening, stretching, and balancing each joint in the upper body along with the relaxation given for 1 to 1½ hours for 8 weeks. The control group was offered a wrist splint to supplement their current treatment. Yoga was more effective than the wrist splint or no treatment in relieving symptoms and signs of carpal tunnel syndrome including grip strength, pain intensity, sleep disturbance, Phalen sign, and Tinel sign, and median nerve motor and sensory conduction time (Garfinkel et al., 1998).

In conclusion, there is a variety of yoga styles, and there is no such thing as a typical yoga session. The majority of yoga practices last between 30 and 90 minutes. It employs simple postural, breathing exercises, relaxation and meditation practices, and

may or may not be done in accord with medical treatment. It emphasizes mind-body integration, extended awareness and the cultivation of a sense of harmony. Prior experience of yoga is not required.

The Five Sheaths of Existence Model of Yoga in Pregnancy and Childbirth

The “holistic” is addressing the various levels of healing the whole person. This is achieved through an ancient psychological model of the human being called the five *koshas*. This model describes the person as multidimensional and health is related to the five *koshas* or the five sheaths of existence. By using the five *koshas*, it addresses every level of the person individually and as an integrated whole. The following are the five *koshas* that form the foundation of yoga therapy (Le Page, 2002). Based on the five sheaths of existence in the yoga model, its implications in pregnancy and in the childbirth experience are presented as follows.

1. Anna-maya-kosha (physical body)

“*Anna*” means “food”, and this sheath feeds the awareness into the other layers and provides the capacity to sustain the other four *koshas*. The first level to consider is the physical body, including the anatomical structures and physiological processes. When the energy flow becomes blocked to an area, or the energy is congested in a part of the body, or there is an imbalance of positive and negative energy, then separation, illness, discomfort, or pain results (Jimenez, 1988; Le Page, 2002). The transitional nature of pregnancy and birth is thought to make a woman more vulnerable to energy imbalances at these times, giving rise to pregnancy discomfort and childbirth pain (Jimenez, 1988).

There are many physiological changes during pregnancy that may cause the imbalance of the energy to the pregnant woman and the fetus. For instance, the circulatory system increases blood flow resulting in valves of the anus and legs relaxing and causing hemorrhoids and varicose veins. Separation could occur if the circulation is not working properly and the baby is not getting a sufficient supply of nutrients. This could bring stress on the mother and the fetus. As the mother gains weight, the uterus begins to press on the diaphragm. Pregnant woman and her fetus may get the improper supply of oxygen. Thus, breathing can become labored during pregnancy. Furthermore, if a mother is out of balance, this causes an alteration to the immune system that may lead to a vulnerable of disease or infection. In addition, muscles become fatigued because of weight gain, and the skeletal structure becomes compromised as the baby grows. The bones soften to cushion the weight and the uterus expands to make room for the growing baby, which also leads to pressure that causes pain in the groin.

Labor is a physiological event that is commonly accepted as tiring. Because of energy demands, fatigue may lengthen labor just as length of labor may affect the development of fatigue (Pugh & Milligan, 1993). Childbirth is a stressful experience with pain, fatigue, fear, and negative moods reaching high levels as labor progresses (Chang, Wang, & Chen, 2002). One of the responses to this experience is that blood flow is compromised due to tightness of muscles or uterine contraction; therefore, there is no energy flow or awareness in the *chakras*, *nadis* or nature. In relation to the physical body, separation is seen as a lack of body awareness. As the individual becomes more aware of the messages from the body, including from areas of stress and tension, a foundation is created for activating the relaxation response, allowing the

body to return to a state of balance (Le Page, 2002). As pain increases, muscles tighten and produce lactic acid; chemicals are secreted by adrenals to mediate fight or flight responses to stress. Adrenaline and other chemicals stimulate the sympathetic nervous system, with the continuation of stress creating a neuro-endocrine imbalance in the body. Adrenals go into over drive providing a number of effects in terms of continued muscular contractions causing muscle spasms and pain. This limits the ability of the liver to breakdown tissue proteins, which decreases the availability of energy to the muscles. The person is out of touch with their body or there is a lack of body awareness.

The yogic approaches at this level focus on the first three of the eight limbs of yoga. The first two are called *yama* and *niyama*. In relation to the health of the physical body they refer to promoting a non-harmful, truthful way of life or the bringing of a lifestyle and diet appropriate for the individual. The next limb is called *asana* that refers to the physical yoga practice, which eases tension, promotes increased flexibility in muscles, calms and soothes. *Asanas* are divided into *brahmana* (active) that are needed to increase blood flow and reduce tension in stressed areas and to improve overall immunity, and *langhana* (passive) that promotes calm and balance. Overall, the practice of yoga induces relaxation responses, releases muscular and nervous tension, massages the musculoskeletal system, improves body awareness, stretches and relaxes the circulatory system, lowers blood pressure, reduces heart rates, massages adrenals, helps the digestive system and the assimilation of nutrients, improves respiratory functions, and stimulates the immune system and the flow of lymphatic fluid.

2. *Prana-maya-kosha (energy body)*

“*Prana*” means “life force energy”, and this sheath contains and regulates the movement of the physical and mental energies through the energy channels (*nadis*) and energy centers (*chakras*). A proper flow of energy is necessary for maintaining good health. The breath forms a bridge to the energy body, and the breathing patterns are the window into it. Correcting breathing patterns can enhance energy flow throughout *chakras* and body. If energy is constricted, mother and baby could suffer from disease and bring separation in both. Constant breath awareness and continuous flow of *apana* are necessary. During labor, the physiological change of the sympathetic nervous system is over stimulated, thus creating shallow, rapid breathing, which leads to fatigue or lack of energy in the whole body which appears listless, ungrounded or numb, and this affects all *prana vayus*.

The limb of *pranayama* is reestablishment that brings a natural balance in the flow of *prana* and *apana* through breathing and guided imagery, along with *prana-vidya* exercises which direct healthy energy into the circulatory system. In addition, *chakra* therapy is an aspect of work at this level. Thus, yoga helps bring out emotional blocks and unconscious belief patterns through awareness in order to release individuals and connect them with nature.

3. *Mano-maya-kosha (psycho-emotional body)*

“*Mano*” refers to “mind” and this sheath contains mental thoughts and emotional feelings. This *kosha* governs the rational, linear, and sequential thought processes, which comprise the personality. It is assessed in relation to the state of mind. Manifestations of separation in the *mano-maya-kosha* are denial of self-care, needs recognition, resentfulness, self-righteousness, unfocused or passive behavior,

feelings of not being good enough, and self-doubt. It also leads a person to feel isolated from family, society, and even from those who should be the foundation of their emotional support. In this *kosha*, the body is already experiencing daily changes that can greatly affect the emotional state. Mothers would want to regulate the stress response system to keep emotions in balance. Stress in the mother could cause disease and potential loss of the fetus. Separation could occur if the mother has not fully accepted the child. The limb of *Pratyahara* is the technique of bringing the focus inside and reducing external stimuli. *Yoga nidra* is the main resource of the yogic process for exploring and integrating all the *koshas*.

4. *Vijnana-maya-kosha (wisdom body)*

“*Vijnana*” means “knowledge”, this sheath contains the higher cortical functions of reflection, intuition, planning, creativity, or the wisdom and witness of consciousness. The mother gains insight into her daily activities, diet, thought patterns and how they will translate to the baby. Without awareness a mother will lose insight and connection to her baby.

At this level, the aim is to encourage the development of the witness, the part of the self that has the ability to stand back and take a wider view of the situation in life. The yogic technique focuses on the limb of *dharana*, which refers to all the ways that seek development of consciousness and awareness.

5. *Ananda-maya-kosha (bliss body)*

“*Ananda*” refers to “bliss”, and this sheath contains pure unchanging happiness, joy, love, peace and ecstasy that are found at the deepest layer of the being. These are not merely feelings, but a state of being that has always existed yet has been buried by the other *koshas*. Behind this thin layer resides the pure consciousness of the

“true self”. Moments of enlightenment will reassure the mother of her purpose in this life and her commitment to bring her child into this universe. Separation can occur if the mother is not aware of her purpose in life. The integration of all five *koshas* is relevant to the overall well-being of mother and baby. Therefore, the yoga path does involve efforts required to break the lens of conditioned perception so that a person can lay down the life that they carry as a cross and look out at the world around them and smile in bliss.

The bliss body is a means to facilitate the memory of the joy and peace that are always present and ready for recall. The yogic practices will focus on the limb of *dhyana*, or meditation. This experience of bliss is developed and stabilized over time, which leads to *samadhi* the final stage of the eight limbs. The bliss body is a key concept in yoga therapy because it reminds a person of what is already whole and healed within the self; it means that the work at this level is to access and rediscover who the person already is.

At the beginning of yoga practice, the primary focus is on *Anna-maya- kosha*, the alignment and physical sensations of the physical body. After the first sheath has connected, the breath is used as a bridge into the *prana-maya-kosha* to connect with the energy manifesting in the body. Focusing on the body, breath, and the energy absorbs the mind, and the thoughts diminish allowing the *mano-maya- kosha* to dissolve. At this stage, the *vijnana-maya-kosha* can be explored to access intuition and inner wisdom, and to move through to the *ananda-maya-kosha*. True enlightenment happens when all the *koshas* dissolve and become absorbed in the true self. Thus, the path of yoga is one of progressively moving inward, through each of the *koshas*, to

experience the radiance of the true self. At the same time, yoga allows this inner radiance to shine through the individual.

In relation to the area of maternal and child healthcare, Narendran and colleagues have investigated the stress management in pregnancy using the Integrated Approach of Yoga Therapy (IAYT) to improve pregnancy outcomes (Narendran et al., 2005). The practices included; physical postures (*asanas*), breathing techniques (*pranayama*), and meditation which were practiced every day for one hour by a yoga group from the date of entry into the study (between 18-20 weeks gestation) until the delivery of the baby. The control group, however, only walked for half an hour twice a day during the study period. The result indicated that the number of babies with birth weight $\geq 2,500$ grams was significantly higher in the yoga group ($n = 169$) compared to the control group ($n = 166$) and preterm labor was significantly lower in the yoga group. Complications such as isolated intrauterine growth retardation (IUGR) and pregnancy-induced hypertension (PIH) with associated IUGR were also significantly lower in the yoga group. No significant adverse effects were noted in the yoga group.

There is also a study to test the efficacy of yoga on birth outcomes during pregnancy. The randomized control study was conducted with 21 women in the yoga group and 19 women in the control group. Women were matched for age, gravida and gestational age. The yoga group practiced, including physical postures, breathing, and meditation for one hour daily from the date of entry into the study until the delivery. The control group practiced standard antenatal exercises for one hour twice a day during the study period. The number of hours of labor decreased significantly ($p < 0.01$) and birth weight increased ($p < 0.01$). There was a significant decrease in

complications ($p < 0.01$), less anesthesia requirement ($p < 0.001$) and more normal deliveries ($p = 0.05$) (Maharana, 2006).

Components of the Yoga Intervention

The midwifery study by Sakala (1988) suggests that all midwives felt that assistance with intrapartum pain should begin during prenatal care. The extent of their emphasis on prenatal preparation is indicative of their strong preference for preventive measures. The broad range of activities involved and the many differences in client need, affected the required amount of the specified intervention to be administered (Huber, Hall, & Vaughn, 2001; Sidani, 1998). Criteria for the effectiveness of the strength of intervention include precision, safety, and accuracy (Huber et al., 2001). The elements and definition of the strength of intervention are identified as: quantity (the amount of the target activity in one episode), frequency (the rate of occurrence or repetition), duration (how long the activity is available over time), and breadth (the number and type of possible intervention components over activities). Yoga is a recommended activity during pregnancy both for inactive women (those who were not physically active prior to pregnancy) and active women (those who were physically active prior to pregnancy).

The clinicians or health care providers must consider the individual patients' needs and limitations and thoughtfully formulate exercise prescriptions. Every woman must be thoroughly screened for personal risk factors. Recommendations must be tailored for the individual and re-evaluation must often be undertaken. Increasingly evidence suggests that moderate-intensity exercise during pregnancy improves

maternal fitness, decreases discomforts associated with pregnancy, elevates maternal well-being, and has few adverse effects (ACOG, 1994; Horns, Ratcliffe, Leggett, & Swandon, 1996).

The American College of Obstetricians and Gynecologists defines moderate exercise as brief sub-maximum maternal exercise up to approximately 70% of maternal aerobic power. It has also been defined as activity that leads to roughly 60% to 80% of the maximum amount of oxygen an individual can consume (VO_2 max) with heart rates in the range of approximately 115 to 162 beats per minute (ACOG, 1994). However, the American College of Sports Medicine (ACSM) recommends that intensity should be 60-90% of maximal heart rate. The lower end of these ranges (60-70% of maximal heart rate) appears to be appropriate for most pregnant women who have not engaged in regular exercise before pregnancy, and the upper part of these ranges should be considered for those who wish to continue to maintain prior fitness levels during pregnancy. In a meta-analysis study of exercise and pregnancy, it was reported that with exercise intensities of 81% of heart rate maximum, no significant adverse effects were found (Artal, O' Toole, & White, 2003).

In addition to the type and intensity of the exercise mentioned above, two concerns should be addressed before prescribing prolonged exercise regimens (in excess of 45 minutes of continuous exercise) for pregnant women. The first is a thermoregulation that exercise should preferably be performed in the thermo-neutral environment or in controlled environmental conditions (such as with air conditioning). Attention to proper hydration and subjective feelings of heat stress are essential. The second concern is energy balance. Energy costs of fitness exercise should be estimated and balanced by appropriate energy intake. Setting of limits to exercise

duration is not possible because of the reciprocal relation between exercise intensity and duration. It should be noted that, in studies in which exercise was self paced, in a controlled environment, core temperature rose less than 1.5°C over 30 minutes and stayed within safe limits. Concentrating the activity in shorter exercise periods, such as 15-minute periods, may obviate concerns related to thermoregulation and energy balance during exercise sessions. The current CDC-ACSM recommendations for exercise aimed at health and well being, given the absence of either medical or obstetric complications, state that pregnant women could adopt an accumulation of 30 minutes a day of exercise on most if not all days of the week (Artal et al., 2003). Finally, pregnancy is not a suitable time for greatly improving physical fitness. Therefore, women who have attained a high level of fitness through regular exercise before pregnancy should exercise caution in engaging in higher levels of fitness activities during pregnancy. They should expect overall activity and fitness levels to decline somewhat as pregnancy progresses (McMurray et al., 1993).

To summarize, in the absence of obstetric or other clinical complications, most women can exercise for an accumulation of 30 minutes or more of moderate intensity physical activity to maintain cardio-respiratory and musculoskeletal fitness throughout pregnancy. Based on the research studies of yoga-based intervention programs, there are variations in the duration, intensity and frequency of practice that are appropriate for the clients' physical health, their problems, and their individual needs.

Regarding yoga practice in pregnancy Balaskas (2003) suggests that, ideally, the earlier it is started the better. Some women begin to practice yoga before they conceive and this can be an advantage. Early pregnancy is a very good time to start, from as early as twelve weeks, provided the midwife or doctor agrees. If there had

been any problems with conception, bleeding or miscarriage, then it might be wise to give the pregnancy time to settle and to begin at around sixteen weeks. However, it is never too late to start, even in late pregnancy. The last few months and weeks are very important and the body will respond rapidly to the postures because of the higher level of hormones during pregnancy. It is best to set aside 30-60 minutes each day for more formal yoga practice, when pregnant women can relax and concentrate more deeply without any distractions or disturbances. If daily practice is really impossible, then the effort should be made to practice at least two or three times a week.

Yoga provides vital tools for pregnancy (Pregnancy and Yoga, 2003). By using the *koshas*, together with a list of the eight limbs of yoga to support and encourage wellness for pregnant women, the integration of yoga components in this program are as follows (Balaskas, 2003; Le Page, 2002).

1. *Yoga Asanas* or exercises are ways of moving or holding the body in different positions. Varying widely in application and style, these exercises (postures) gently stretch and explore all parts of the body. During pregnancy, yoga *asanas* are a gentle way to keep active and supple. The remarkable effects of these postures in pregnancy show the power of yoga for ensuring a smooth pregnancy, a relative easy natural childbirth and restoration of body shape after childbirth. At the subtle level, these ensure optimum supply of blood and nutrients to the developing fetus.

2. *Pranayama* or breathing exercise, good breathing and the control of *prana* (energy) are absolutely vital for a woman to enjoy better fitness for her pregnancy and provide a better life-force for her child. In preparation for childbirth, mastery of a few simple *pranayamas* can help birthing energy to flow more smoothly. These phenomenal techniques help to release emotional tension during labor. The breathing

techniques for a woman who was about to deliver a child in the current study were sectional breathing; abdominal, thoracic, and clavicular breathing.

3. *Bandhas* are the psychophysical stimulation of the gestures and locks, which have powerful effects on a woman's reproductive organs. The practice of *bandhas* (psycho-physiological energy release techniques) in pregnant women is aimed at attaining mental stability through *pranayama* (control of the life force). This stability and tranquility arouses the *kundalini*, or the divine power, and leads to higher states of awareness and meditation.

4. *Chanting Mantra* is a word or series of words chanted aloud or silently to evoke spiritual qualities. This component was practiced harmoniously and in an orderly manner with the *yoga asanas* and *pranayama* in order to improve flexibility, muscle force control, endurance, balance and body coordination of the body segment, to reduce fatigue, to relieve some of the discomfort of pregnancy, to promote body awareness and concentration, to elicit a relaxation response, and to promote mental clarity by focusing on the sound of breathing.

5. *Yoga Nidra or Deep Relaxation* is an expression widely used to denote the highest state of consciousness. Although *yoga nidra* means yogic sleep, it is actually a wakeful state of deep introversion. Some contemporary yoga authorities employ the phase of *yoga nidra* to designate a state of deep relaxation. Thus, deep relaxation or yogic sleep is particularly effective during pregnancy as it brings physical and mental relaxation as well as preparation for childbirth.

6. *Meditation* will help pregnant women explore their inner self, and establish a connection with their child. For therapeutic purposes, meditation can help to resolve the deepest of neuroses, fears and conflicts that are a major cause of stress and ill

health. Therefore, meditation brings with it an incredible awareness that works at a very subtle level. It has an extremely positive effect on pregnant woman's senses and on the developing fetus.

In conclusion, yoga is considered safe for pregnant women. From the beginning to the end of pregnancy, yoga practice of relaxation, breathing, and stretching and strengthening exercises help women to accept the changes in their body, mind, and spirit during and after pregnancy. It is also beneficial in many other ways, especially in developing awareness of the personal self and of the baby. Thus, pregnant women would have more control over their own and their baby's health and well-being. Prenatal yoga also provides an opportunity to explore one's response to pain, and to develop relaxation and coping strategies for labor when the pain during contractions will exceed one's usual pain threshold.

Risks/Adverse Effects in Yoga Practice

Most publications about using yoga for treatment emphasize taking precautions and point out that if they are done incorrectly or without preparation, various asanas can cause disease. For example, for persons with arthritis, asanas should be developed slowly when joints or the splint is stiff (Garfinkel & Schumacher, 2000). Patients with known cerebrovascular insufficiency should be cautioned against prolonged head turning during yoga practice. There are some rare reports of disability related to the practice of yoga, including vertebral artery dissection (Hanus, Homer, & Harter, 1977; Nagler, 1973; Pryse-Phillips, 1989; Russell, 1972), persistent out of body experiences (Kennedy, 1976), and development of orbital varices (Cohen, 1995).

A few studies have reported negative responses when using relaxation techniques. A survey of relaxation practitioners indicated that 3.5% of their patients experienced side effects such as fear of losing control, intrusive thoughts, muscle cramping, sexual arousal, and disturbing sensory experiences. These side effects resulted in the termination of relaxation therapy. Psychotic symptoms developed in one of 263 patients in the same study (Carney, 1983). Moreover, Carlson and Nitz (1991) reported pain and involuntary muscle twitching of the leg in one individual with chest pain who was being treated with both conventional medical intervention and relaxation techniques. The pain of the leg injury persisted despite the cessation of the relaxation techniques. The author's conclusion was that relaxation could either resolve or precipitate dysfunction in susceptible individuals.

The programs that gradually build from the most simple and safe asanas seem the most reasonable to follow, although those making extravagant claims without documentation should be looked at carefully (Garfinkel & Schumacher, 2000). Yoga is safe as long as participants do not push themselves beyond the point of mild tension. A sense of competition (with others or oneself) often leads to strain in an attempt to attain or maintain a pose and injury may follow. Common sense should always prevail. Inverted poses should be avoided during pregnancy, and gentle practice should be performed under the guidance of an instructor well versed in yoga for expectant mothers (Greenfield, 2002). A woman should always check with her caregiver before beginning any prenatal exercise program, especially if she has a history of health problems or any concerns about her pregnancy (Rothlein, 2003).

White (2001) suggests certain precautions when using the yoga practice of asanas for pregnant women, such as, avoid back bends because they put too much

pressure on the softened ligaments of the lumbar spine, avoid severe twists positions that do not feel right and avoid force or strain during any of the poses or stretches, and a chair or wall should be used for standing postures when balance is unstable (Allen-Logosso, 2003). Asanas must be stopped if there is any vaginal bleeding and an obstetrician should be consulted immediately. To sum up, yoga is very beneficial during pregnancy but pregnant women should be careful in practice.

Kolcaba's Theory of Comfort: The Application for Parturient and Pregnancy

As alternative and complementary therapies are becoming more popular and requested more frequently, nurses are being asked to integrate a holistic approach to the care that they provide. Although some nurses have always used a holistic approach to care for the childbearing woman, others have practiced with a more objective, or biomedical approach. To assist nurses to either confirm or change their perspective, an organizing framework is helpful. This study used Kolcaba's theory of comfort (Kolcaba, 1994) to explain and predict how alternative therapies are especially well suited for relieving discomfort during pregnancy and the associated labor process. Because the outcomes of this theory are holistic and positive, it is particularly well suited for the care of the woman experiencing the normal, physiological process of pregnancy and childbirth. This theory is also useful for evaluating the effectiveness of the comfort measures that are provided.

Kolcaba and Kolcaba (1991) synthesized the meanings of comfort into three classes: the state sense, the relief sense, and the renewal sense. In the first sense, the state of ease, comfort does not mean absence of discomfort but rather this state is

relative to individual characteristics. That is, persons differ in how they describe and experience discomfort and ease. In the second state, the relief sense, there is relief from conditions that cause or contribute to discomfort. The final state, the renewal sense, refers to a state of being strengthened and having enhanced powers and positive attitudes. In brief, “comfort measures can strengthen a person even though he remains uncomfortable” (Kolcaba & Kolcaba, 1991; p.1306).

Schuiling and Sampsel (1999) also referred comfort as multidimensional and it is expressed in all three domains of body, mind, and spirit. Comfort in the “body” domain indicates that physical needs have been met, such as relief from physical pain. Comfort in the “mind” domain indicates peace of mind, security, or freedom from anxiety. Indicators of comfort in the “spirit” domain are the feelings of being connected with a higher power, and that the higher power assists with the transcending or surpassing of physical and/or emotional pain. They used the term “holistic comfort” as meaning that all needs are met within all three domains. Finding and maintaining comfort is common to all people (Schuiling & Sampsel, 1991). Thus, the concepts of holism and comfort are connected. It would be difficult to speak of comfort without considering the mind, body, and spirit and their connections (Koehn, 2000).

Kolcaba (1994) defined comfort for nursing as “the satisfaction of basic human needs for relief, ease, or transcendence that arise from stressful health care situations.” The three basic assumptions of the theory of comfort are as follows: 1) people have holistic responses to complex stimuli; 2) comfort is a desired nursing outcome; and 3) people strive to have their basic comfort needs met (Kolcaba, 1994).

Furthermore, Kolcaba defined a stimulus situation as “that part of the total environment to which people attend and react during a given episode in their life”

(Kolcaba, 1994, p.1180). The stimulus situation consists of obstructing, positive, and interacting forces. Negative tension produces an imbalance between available obstructing and facilitating forces. Nurses identify needs for comfort and administer appropriate interventions intending to move tension in a positive direction. The endpoint of the theory of comfort is that there is an increase in comfort, indicating that negative tensions are decreased and positive tensions are increased (Koehn, 2000).

Koehn (2000) explained that labor is described as painful for most women. When pregnant women, as well as their male partners, are asked in a childbirth preparation class, what is the first thing that comes into their mind when they think of labor, a typical response is pain. Pain is accepted as normal for the childbirth experience. Pain is individual, subjective, and personal (Lowe, 1996). Besides acquiring education for childbirth, the anticipation of labor pain or the fear of labor pain is often one of the driving forces for women and their partners to attend childbirth preparation classes. They want to know how to deal with the pain.

In general, labor pain has two basic components: a primary phenomenon of afferent output from sensory receptors; and a secondary phenomenon that involves process and reaction. The first is of physiological origin and comes from the stimulus and the response of sensory receptors. This component overlaps and leads to the second phenomenon when the afferent stimulus erupts into consciousness. It is in this component that an individual recognizes, processes, and reacts to the stimulus. A wide variety of factors, including emotional, social, cultural, motivational, and conceptual factors, determine how individuals react to pain (Lowe, 1996).

Pain during childbirth has multiple sources and perceptions. Physiologically, the perception of acute pain during labor originates with the transmission of noxious

sensory input to the central nervous system (CNS). The stimuli that give rise to pain generally are those associated with actual or potential tissue damage, and the response to these stimuli involves reflex and cognition. During the first stage of labor, visceral pain usually predominates, with the transmission of nociceptive stimuli from the uterus, cervix, adnexa and pelvic ligaments. The stimuli are transmitted primarily via sympathetic fibers to the posterior nerve root ganglia at T10 through L1. As fetal descent increases during the late first stage and early second stage of labor, distention and traction on the pelvic structures surrounding the vaginal vault all become the predominant source of noxious sensory input. Finally, the second stage of labor is dominated by stimuli arising from distention of the perineal structures. These stimuli are transmitted by the pudendal nerves through the sacral plexus to the posterior nerves root ganglia at spinal levels S2 through S4 (Bonica, 1990).

In the reproductive system, both mechanical and chemical nociceptors have been found in the ovaries, uterus, and broad ligaments (Bonica & McDonald, 1990). The high threshold mechanoreceptors are stimulated by intense pressure, such as that associated with uterine contractions. The increasing intensity of perceived pain commonly observed with the progression of labor might be attributable in part to a lowered response threshold in the mechanoreceptors produced by the repeated stimulation of uterine contractions. In addition, a number of substances are released by myometrial cellular breakdown during repeated uterine contractions that may lead to chemoreceptor stimulation. Thus, the intensity of labor pain has been shown to increase with the greater cervical dilatation and to be positively correlated with the intensity, duration, and frequency of uterine contractions (Brown, Campbell, & Kurtz, 1989; Melzack, Kinch, Dobkin, Lebrun, & Taenzer, 1984). Throughout labor,

additional noxious stimuli may be transmitted because of traction and pressure on the adnexa and parietal peritoneum; and there is pressure on a stretch of the bladder, urethra, and rectum. Moreover, there is pressure on one or more roots of the lumbosacral plexus, and reflex skeletal muscle spasm in the structure supplied by the same spinal cord segments that supply the uterus and cervix. Referred pain from the anterior abdominal wall, iliac crests, gluteal area, thighs, and lumbosacral regions may also be experienced because of the stimulation of neurons from these regions by afferent stimuli from the pelvic organs according to the dermatomal rule.

When pain is perceived the effects may be both psychological as well as spiritual. Coping methods may relate to previous pain experience, whether that is childbirth or other types of injury or insult to the body. From the perspective of the affective-cognitive view of pain, although some anxiety is considered normal for women during labor, excessive anxiety produces increased catecholamine secretion that may actually augment nociceptive stimuli from the pelvis and magnify the perception of nociceptive stimuli at the cortical level (Lowe, 1996). A study by Lederman et al. (1978) found that increased maternal anxiety correlated significantly with increased levels of plasma epinephrine (a biochemical measure of anxiety), which were significantly related to decreased uterine contractility and lengthened duration of labor.

Chapman and Gavrin (1993) summarized definitions of sufferings as: (a) involving a perceived threat to the self that may encompass the body, the psychosocial self, or both; (b) being inherently emotional, unpleasant, and psychologically complex; and (c) constituting an enduring psychological state and not a transient or fleeting experience. Suffering and helplessness are experienced when individuals have

insufficient resources and are unable to cope. The key elements in suffering have many applications in response to the pain of labor. They help to explain the reason why a multitude of approaches such as childbirth preparation, supportive care, and nonpharmacological pain coping strategies may enhance women's ability to deal with labor pain, without substantially decreasing the intensity of the sensory components of pain. These strategies all have the potential to decrease the sense of helplessness of the parturient and may ameliorate or even prevent suffering (Lowe, 2002). Furthermore, the concept of loss must also be considered to fully understand the experience of suffering. For the parturient, potential loss may be perceived because of the loss of control over self and over the environment in many birthing settings, or even the fear of death of self or baby (Lowe, 2002).

Even though pain and suffering share the common elements of negative emotion and often occur together, each may exist in the absence of the other (Chapman & Garvin, 1993). If a parturient understands the origin of her pain (cervical dilatation and descent of the fetus), she perceives the eventual birth as highly positive (hence pain as a "good" sign of progress toward a desired goal), and perceives labor and its pain as a non-threatening life experience to be mastered. She may experience great pain but not suffer. For the women who choose to persevere and labor without analgesia in the face of pain, or even great pain, an immense sense of accomplishment and real enjoyment may coexist, and be independent themes of the labor experience (Lowe, 2002). The dimensions of fulfillment/achievement and of emotional feelings in the childbirth experience were both seen as being independent of the perceived painfulness of childbirth.

There are many factors that women ascribe to the meaning of labor pain experience (Affonso, Walpoe, Akamatsu, & Bonica, 1979). These include: attitudes and values concerning the childbirth event; adaptation made throughout the pregnancy, such as determining which aspects of pregnancy are pleasurable or frustrating; attitudes toward the future role of parenting; and benefits versus risks in the childbearing event.

A woman's "self-efficacy for labor", or confidence in her ability to cope, has a powerful capacity to decrease pain perception and decrease medical/analgesia use during labor (Lowe, 1989). Self-efficacy can also be enhanced through experience with labor and is reflected in higher confidence about labor expressed by multiparous compared with nulliparous women (Lowe, 1992). The ability to use various pain coping strategies (such as relaxation, distraction, imagery, reversal of effect, breathing techniques, normalization, control, idiosyncratic strategies, and focusing during the stress of labor) is primarily dependent on the woman's self-efficacy or personal belief in her ability to do so (Niven & Gijbers, 1996). Therefore, comfort and comfort care measures appear to be variables that would increase maternal confidence (Schuiling & Sampelle, 1999).

Because pain does not exist outside of the sufferer's individual context, it has a sociocultural dimension comprised of demographic, ethnic, cultural, spiritual, religious, social, and related factors that influence pain perception, and response. There has been strong evidence of an association between culture and pain response, beliefs, and behavior (Weber, 1996).

Birth is also viewed as an important event by all cultures, but the norms surrounding birth are culturally diverse. Culture and ethnicity are often suggested as

being significant mediating variables on women's experience of labor pain. For example, Western Israeli women reported significantly less pain during labor than Middle-Eastern Israeli women. Among the Middle-Eastern Israeli women, women of low educational attainment reported significantly more pain than women of high education (Weisenberg & Caspi, 1989). It was suggested that education could ameliorate the influence of familial culture on response to pain. These findings emphasize the importance of culturally learned values and attitudes to the perception and expression of acute pain (Bates, 1987).

In the United States, there seems to be a popular belief that labor pain is bad, and the parturient should be relieved of her pain as soon as possible. Some even suggest surgical abdominal delivery is an option to avoid the pain and stress of labor (Walters, 1999). Thai women respond to labor pain differently from those in the Western countries. The ability to keep silent is perceived to indicate the maturity of the woman. Crying out, groaning, and moaning are considered childish and inappropriate responses that imply a future inability to care for the newborn. However, a restless woman is considered to have a high level of pain and analgesics and/or sedatives will be administered. Receiving pain control measures does not reflect negatively on the woman. Labor support by family members is not encouraged, and many hospitals and clinics do not allow family members, especially men, into the labor and delivery unit. However, in a very few private hospitals, the western practice of allowing husbands into the delivery room has been introduced and has gained some acceptance (York, Bhuttarowas, & Brown, 1999).

Taken all together, the body cannot be separated from the mind and spirit, and changes in one part of the person affects other aspects of the person at the same time

(McGovern et al., 2003). Therefore, an understanding of the physical and psychosocial aspects of labor pain is needed to provide laboring women with proper management in accord with to the individual woman's needs and desires.

The medical interventions suggest that removing all the pain of labor is preferred. However, childbearing is not just a physiological phenomenon, and to totally eliminate pain does not allow women to interpret and to react to negative stimuli. For some, pain is not an inherently negative phenomenon, but it is a natural part of life. Pain provides valuable signals originating from psychological conflicts that need to be considered (McGovern et al., 2003). Frequently, pain will not only guide women to seek the most comfortable position but will also move the baby into the best position to enhance the birth process. Schuiling and Sampelle (1999) stated that pain modifies and affects the levels of comfort women achieve during childbirth. However, the absence of pain is neither necessary nor sufficient to experience comfort. As stated earlier, many factors influence women's perception of pain. Likewise, many factors can decrease pain or provide comfort despite pain (Koehn, 2000).

The theory of comfort also provides the framework for assessing how alternative and complementary therapies can enhance the positive outcomes of the childbirth experience (Koehn, 2000). Nursing has been considered to be a holistic practice throughout its history, and the theory of comfort can guide nurses to consider all aspects of laboring women when assessing labor status and developing a plan of care. The onset of labor or the early phase of labor provides initial stimulation and causes the initial negative tension. As negative tensions increase, or as the perceptions of discomfort increase, imbalance begins as obstructing forces are out-weighting facilitating forces. For example, in the term of labor, as the contractions increase in

intensity and frequency, as cervical dilatation increases, as fewer coping mechanisms are used, and as feelings of loss of control may consume the woman, there is the loss of balance between comfort and discomfort. At this point, the laboring women and their respective nurses both need to identify interventions that can provide relief from conditions that are interfering with a more comfortable state. Interventions are determined and performed with the outcome of moving tension in a positive direction. Therefore, laboring women and their nurses evaluate whether the outcome of comfort has been met. An increase in comfort indicates that positive tensions are being restored, leading to more constructive behavior. Constructive behavior, described as a sense of renewal, can strengthen women even though they may be experiencing discomfort. An example is the woman who, through relaxation techniques remains relatively comfortable and 'in control' although labor intensifies. She is experiencing this state of renewal, through which she may have strengthened motivation and a positive attitude toward the challenge of progressing labor (Kolcaba & Kolcaba, 1991; Kolcaba, 1994). This may serve to enhance feelings that empower the woman.

The implications are that yoga, in relation to pregnancy and childbirth, can bring many benefits and also aim at comfort enhancement. Pregnancy is a transitional time in a woman's life and brings profound physical and emotional changes. During the nine months of pregnancy there are also great emotional adjustments as the expectant mother prepares for birth and becoming a parent. Yoga practice during pregnancy can help a woman to nurture and ground herself during this time of transformation and adjustment. Prenatal yoga provides a program of safe, gentle, and effective exercises. Yoga practice strengthens the abdomen, back and pelvic muscles, improves circulation, aids digestion, and exercises the spine. Yoga can also help

alleviate many of the common aches and discomfort of pregnancy; such as, constricted breathing, constipation, swelling, back pain, sciatica, and insomnia. Techniques of good posture are taught thus bringing awareness of good body alignment into everyday life to increase overall comfort. Many yoga poses not only help prepare the body for giving birth, but can also be helpful during labor. Therefore, yoga postures can be adapted to meet the individual needs of each woman during the many stages of pregnancy. In yoga, there is a strong focus on linking the postures with breathing, as the body is eased into alignment with awareness of breathing. This helps to create a state of calmness and self-awareness, as each woman learns to listen to her breath and her body as she stretches and moves. The breath is used not only when practicing the postures, but it is also a tool to help with relaxation. One primary purpose of yoga is to facilitate the profound inner relaxation that accompanies fearlessness (Schiffmann, 1996). Fear during labor initiates a stress response leading to distress and a sense of helplessness. Breathing and relaxation during labor help to reduce pain by alleviating the distress that accompanies the pain (White, 2001). Learning to breathe and relax is necessary during the physical demands of labor and birth. As the expectant mother practices relaxation during her pregnancy, she will become aware of what the sensation of relaxation feels like within her own body so that she is better able to tap into this sensation during labor. In addition, tuning into breathing helps many women feel more connected, not only to their own bodies and emotional growth during pregnancy, but also to the baby growing inside them (Rothlein, 2003).

All the disciplines of yoga are intended for one purpose - awakening in people a renewed sense of balance and harmony. The American Yoga Association states that the best techniques for pain management are yoga breathing, relaxation, and

meditation. These three aspects of yoga distract the mind from pain, reduce the body's tension in reaction to pain, and provide an opportunity to "move through" the pain so that it loses its full impact instead of resisting it. Furthermore, simple yoga exercises can also be extremely helpful for learning how to relax muscle tension, improve circulation, and stimulate the body's hormonal system (American Yoga Association, 2001). Therefore, through the physical practice of yoga, the mind, the body, and emotions unite, creating a sense of inner peace and harmony. Yoga provides a means of moving into stillness in order to be guided from within. Yoga works on the mind and body simultaneously. As with birth, it is both a physical and an emotional experience (White, 2001).

Pranayama is breathing more deeply and correctly and this contributes to greater oxygenation of blood during the actual delivery, resulting in a smoother delivery. Conscious deep breathing gives a larger supply of oxygen, which is useful to remove waste products in the body. These waste products are accumulated because of tensions and incorrect breathing, which results in physical stiffness and mental fatigue. Through conscious breathing we can achieve muscular relaxation and calmness of mind (Yoga for women, 2004).

To sum up, yoga supports the desire many pregnant women have to be in control physically, emotionally and spiritually. This brings a sense of connectedness within the self and also with the baby, so that they can both feel prepared and be in an optimal state of health at such a vital time. Two important yoga principles are the practices of attention and stability (*sthira*) and of ease and pleasure (*sukha*). Stability means power and control, not stress, and ease means relaxation and rest; not weakness (Williamson, 2002). Through this the mother is then guided from within herself so

that she trusts her own instincts and works in harmony with her own body as she gives birth to her child.

The Study Variables

Maternal Comfort

Comfort has been defined theoretically as “the state of having met basic human need for ease, relief, and transcendence” (Kolcaba, 1991). The operational definition of comfort is the total and subscale scores on an instrument that measures the two dimensions of comfort. Many types of instruments can be developed using the taxonomic structure (Kolcaba, 1992). There are two dimensions to the theory of comfort. The first dimension has three states: relief, ease, and transcendence. The other dimension is the contexts of comfort: physical, psychospiritual, social, and environmental (Koehn, 2000). The two dimensions (three states and four contexts) are arranged in a two dimensional grid resulting in 12 facets of comfort as shown in Figure 2.

		Sense		
		Ease	Relief	Transcendence
Context	Physical			
	Psychospiritual			
	Social			
	Environment			

Figure 2 The Taxonomic Structure of Comfort

Note. From “A taxonomic structure for the concept comfort”, by K.Y. Kolcaba, 1991, IMAGE: Journal of Nursing Scholarship, 23(4), p.239.

The 12 cells represent the total Gestalt of patient comfort from the perspective of the patients' needs and the fulfillment of their needs. This taxonomic structure facilitates exploration of the patients' needs and the desired outcomes of comfort measures geared towards those needs. Thinking about these aspects of comfort in specific ways gives direction to care and provides an instrumental development to measure the effectiveness of the care. The aspects of comfort are derived from cross-referencing the desired sense of comfort to be achieved with the appropriate context experience. Comfort measures and test items then flow easily from each of the aspects of comfort (Kolcaba, 1991).

Comfort means different things to different people, thus capturing all aspects of the concept in any given instrument is difficult. Therefore, visual analogue scales (VASs) might better represent the person's uniqueness and richness of the concept for study participants, compared to a traditional questionnaire, because the meaning of comfort is not constrained to specific items, especially given the acute and complex comfort needs of women during labor and birth. When used with the population studied, the VASs proved faster and easier to use than the Maternal Comfort Questionnaire. This instrument was developed to measure comfort based on the Kolcaba and Steiner (2000) study of 53 women, over three time points, with early stage breast cancer going through radiation therapy. VASs demonstrated a Cronbach's α value of 0.60. Based on the results of the study, the VASs did not demonstrate statistically significant differences in comfort between groups over time. From the observations during data collection, the authors found that most women scored their total comfort quite high. With an average standard deviation of 1.58 (score range of 1-10), it appeared that the stem for total comfort (see Appendix E) was too broad to

detect differences in comfort between participations. Otherwise, the small standard deviation suggested that most women answered the VAS for total comfort within a very narrow range on the 10cm scale. This narrow range indicates a problematic lack of sensitivity of the total comfort scale. However, the study demonstrated evidence of moderate concurrent validity between the two measures of comfort. Therefore, in order to study the effects of using a yoga program during pregnancy on maternal comfort, comfort was measured using both the maternal comfort questionnaire and the visual analogue scale.

Labor Pain

As a model of acute pain, labor pain highlights individual differences in every aspect of pain. There are multitudes of factors both psychological and physical which contribute to the variability of labor pain (Melzack, 1993). The gate control theory (GCT) suggests that pain is a multidimensional experience (Melzack & Wall, 1965) in which the dimensions of pain include the sensory-discriminative (SD), motivational-affective (MA), and cognitive-evaluative (CE). The interdependence and interaction among these dimensions of pain provide direction to assess and manage acute pain.

Several pain tools are available to measure pain (Melzack, 1975; Melzack, 1987). However, some of them are either difficult to use when repeated measurements are required to evaluate the efficacy of interventions used to decrease pain, or do not provide a multidimensional assessment of pain. Researchers have yet to identify the best way to measure the magnitude of acute pain. Asking a series of questions regarding different aspects of pain has some advantages because pain has both sensory

and affective components. The McGill Pain Questionnaire (MPQ), for example, is a pain assessment tool composed of 78 word descriptors that provide a multidimensional measurement of pain, but it takes approximately 20 minutes to complete (Melzack, 1975). This makes the MPQ impractical to use when a patient is in pain and awaiting treatment. A short form of MPQ has been developed but is limited in that it does not provide provision for assessment of all dimensions of pain (Melzack, 1987). The traditional paper-and-pencil visual analogue scale (VAS) has been used to assess clinical pain. The use of a VAS to assess pain in clinical practice has several advantages over the MPQ and other methods of pain assessment. It is simple to administer and easy to score (Huskisson, 1983; McGuire, 1984). Since few words are used, problems associated with language do not prohibit its use (Grossi, Borghi, & Montanari, 1985; Kremer, Atkinson, & Ignelzi, 1981).

The VAS is a line, usually 100 mm. in length with anchors at each end to indicate the extremes of the sensation under study. The lower end of the scale is to the left in a horizontally oriented scale and at the bottom of a vertically oriented scale. The subject is asked to mark a point that indicates the amount of the sensation experienced at the time. Measuring the millimeters from the low end of the scale of the subject's mark scores the intensity of sensation (Gift, 1989). Thus, the VAS is a uni-dimensional scale quantifying only intensity. Multiples of VAS, to measure different aspects or dimensions of a sensation, is sometimes used. Well-known examples of this approach are the use of VAS to measure the intensity and the distress dimensions of pain and Padilla's multidimensional measure of quality of life (Padilla et al., 1983). Problems exist with this technique; however, as the dimensions may have shared variance that affects statistical tests (Cella & Perry, 1986).

The other method of pain assessment for laboring women is the pain behavioral observation scale. In general, unrelieved pain or repeated stimulation from noxious variables will sensitize the pain receptors, lower the pain threshold, and increase sensitivity to stimulation, even noise and sound (Peck, 1986). This mechanism can be affected seriously because the pain receptors do not adapt to the repeat stimulation. As a result, the affected area is likely to become more sensitive overtime (Long, 1989).

Severe and prolonged acute pain, such as pain in childbirth, is often associated with increased self-absorption, withdrawal from interpersonal contact, fear, anxiety, increased vulnerability, diminished coping ability, and even loss of control. When this unfavorable situation occurs, it is very difficult to obtain compliance from the sufferers (Pathanapong, 1990). Moreover, unrelieved severe pain can lead to sympathetic nervous system over activity, and prolonged severe pain may inhibit uterine contractions and decrease uterine blood flow. As a result, this condition can be harmful to the mother and the baby (McDonald, 2001). Observing the laboring women's behavior while they are experiencing pain will help to gain more understanding about the patterns of behavioral responses to pain in childbirth, and move the pain phenomenon from a subjective to a more objective realm of pain assessment (Pathanapong, 1990).

Birth Outcomes

The health-related outcomes are consequences or effects of interventions, and are shown by changes in any dimension of health or resolution of the problem being

investigated for which the intervention is undertaken (Sidani & Braden, 1998). As labor pain is acute and increases quickly, and because considerable emotions are involved, pain relief poses major problems (Harrison, Woods, Shore, Methews, & Unwin, 1986). In addition to analgesics, self-comforting behavior and nurse-initiated comfort measures are ways in which labor pain can be managed (Anonymous, 1998). Walker and O'Brien (1999) examined the relationship between methods of pain management during labor and birth outcomes. The results showed that the length of the second stage of labor was longer in those who received epidural analgesia or anesthesia. Apgar scores for those who received early epidural analgesia or anesthesia were lower than for those who received late or no epidural analgesia or anesthesia, although Apgar scores were satisfactory across all groups. In the study under discussion, the birth outcomes were length of labor and Apgar scores.

1. Length of labor

When women have a long labor, they will experience more fatigue and stress. Consequently, their pain threshold is affected. Similarly, a large baby or a pelvis that is small or abnormally shaped will interfere with the progress of labor and provoke additional discomfort and fatigue. The mother will ultimately need assistance in coping with pain (Sherwen, Scoloveno, & Weingarten, 1995). The duration of labor varies greatly. The average in the first stage for primiparous women is 8 hours (range 6-18 hours), and for multiparous women 5 hours (range 3-10 hours). The average time of the second stage for primiparous women is 50 minutes (range 30 minutes to 3 hours), and 20 minutes (range 5-30 minutes) for multiparous women. The third stage is usually completed in 30 minutes for both groups (Chan & Liu, 1993).

2. Apgar Score

In 1952, Dr. Virginia Apgar developed the Apgar scoring system as a means of assessing the physical condition of the neonatal immediately after birth. The Apgar score is determined at 1 and 5 minutes. The score serves as a guide for determining the resuscitative needs of the newborn. The total score ranges from 0 to 10, based on five indicators of the health status of the neonate. The heart rate, respiratory effort, muscle tone, reflex irritability, and the color of the neonate are each rated from 0 to 2. A score of 8 to 10 indicates a neonate in good condition, whereas, a neonate with a score of 7 or below may require special attention. A neonate score below 4 signifies serious respiratory and cardiovascular depression. Resuscitative intervention has to be initiated immediately (DiDona, Marks, & Kumm, 1996).

The relationship between maternal comfort, labor pain and birth outcomes are presented in the Figure 3. The health care needs of the pregnant state, and the balancing of comfort and pain level during labor and birth affect the working of the sympathetic and parasympathetic nervous systems. Whether the level of pain increases or decreases, it would affect the uterine contractility and this, in turn, affects the maternal length of labor and the newborn Apgar score.

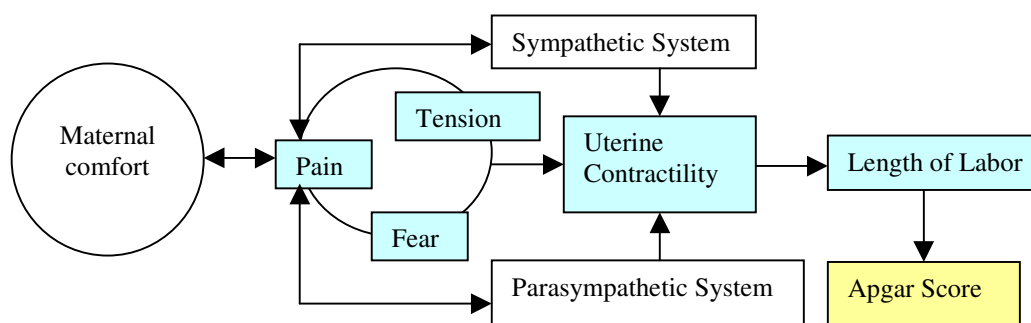


Figure 3. The Relationship between Maternal Comfort, Labor Pain, and Birth Outcomes

In summary, to determine the effectiveness of the intervention in producing the expected effects, the right outcome variable represents the anticipated treatment effect. Besides the intended outcomes, the detecting of maternal comfort during labor and labor pain, the birth outcomes of length of labor, and the Apgar score all had to be explored in this study.

Factors Influencing the Study Variables

Several factors have been identified in the literature that may have an effect on maternal comfort both in the antenatal period and delivery period as well as have an effect on pain or birth outcomes during labor and delivery (Kolcaba, 2003; Lowe, 1996).

1. Maternal Age

The age of the client is an important factor in every nursing situation (Orem, 1985). The characteristic growth and development pictures of an individual at different chronological age periods are valuable guides to the nursing profession in understanding health care requirements and the limitations for a given behavior. Obviously, personal maturation and organic, psychic, and intellectual functioning vary with the periods of the human development life cycle. As for health-promoting behavior, chronological age is related with one's being able to manage the self in one's own environment, involving varying degrees of understanding, reflecting, and judgment. Several studies found that maternal age is associated with seeking prenatal care (Lia-Hoagberg et al., 1990; Petitti, Coleman, Binsacca, & Allen, 1990). Kanavacharakul (1989) found that younger Thai mothers make more antenatal care

visits than older Thai mothers during their normal pregnancy. The National Center for Health Statistics has shown that adolescent pregnant women are more likely to receive adequate prenatal care (Ahmed, McRae, & Ahmed, 1990; Curry, 1990). Adolescent mothers deal with many complex issues, such as development and self-identity, which affect their engagement in prenatal care. In order to exclude adolescent factors, 18 years was the required minimum age for subjects in this study.

With respect to age, it is difficult to determine how age affects labor pain. Older women seem to have more control over their lives, have more support during pregnancy, and do not seem to worry about labor and delivery as much as younger women (Davenport-Slack & Boyland, 1974). However, these researchers found no correlation between the rating of pain during labor and the age of the mothers, which ranged from 16-42 years. The amount of body tension observed during labor was positively correlated with being younger. Nettelbladt, Fagerstrom, and Uddenberg (1976) found that between 18-33 years, the age of primiparas in their study was not related to childbirth pain, whereas another study showed that women who are older with more children have less sensory and affective pain during labor, primarily when the cervix is dilated to 4 centimeters or less, and these are the factors associated with more intense labor pain (Fridh, Kopare, Gaston-Johansson & Norvell, 1988). This is in contrast to the findings of another study of primiparous women, in which younger women experienced a short, less painful labor than older women (Sherwen et al., 1995). Thus these studies have shown conflicting results.

2. Education

Education levels reflect an individual's background of knowledge and skills. Educated people search for health related information from a number of sources.

Ability to comprehend instructions varies with educational level. Pender (1982) posits that those with varying educational levels can draw upon different knowledge and skills in carrying out self-care practices. High school graduates are more likely to have less adequate prenatal care than those who have higher education (Lia-Hoagberg et al., 1990). Petitti et al. (1990) reported that the more education pregnant women have the more likely they are to start prenatal care in the first trimester. In a Swedish study, women who were better educated about childbirth tended to be more secure and sure of their capacity (Fridh et al., 1988). Those with higher education levels had better understanding of what was happening, were less anxious, and required less pain medication. Research also showed that women who practiced psycho-prophylaxis or natural childbirth measures demonstrated little or no pain behavior during labor, but later did report that labor had been painful (Bonica & Mc Donald, 1990). Therefore, lack of knowledge is a major obstacle to safe, effective care and control. The nurse must actively provide information to all women.

Nettelbladt et al. (1976) reported that women who rated their pain during labor as excruciating tended to have no education beyond nine years of elementary school, as did their partners, although poor social circumstances in general were not connected with painful deliveries. Other studies have shown that economic status has no relationship to the amount of pain a woman has during labor and delivery (Almgren, Nilsson, & Uddenberg, 1972). In addition, in a study of the relationship between culture and education to labor pain ratings, the results revealed that, among Middle-Eastern women, those who have less education reported significantly higher pain than the women with higher education (Weisenberg & Caspi, 1989).

3. Income

Income affects the health priorities of families, and access to health care services, facilities and the materials needed to follow through recommended activities. As long as purchasing power dictates the accessibility of health care, lower income groups will have limited opportunity to gain access to health care services and what is needed to develop self-care skills (Pender, 1982). Petitti et al. (1990) reported that higher income women are more likely to begin prenatal care earlier than women with less income, and these findings are consistent with Jintanothaithavon's (1993) research among Thai pregnant women.

Melzack, Taenzer, Feldman, and Kinch (1981) found that socioeconomic status was one of the most important predictors of labor pain for both primiparas and multiparas. In several large American studies it has been found that those women with a higher socioeconomic status experienced less pain and were happier during labor and delivery and more optimistic about their pregnancy and delivery (Eustace, 1978; Fridh et al., 1988; Norr, Block, Charles, Meyering, & Meyer, 1977). Norr et al. (1977) also found that women with a higher socioeconomic status were more likely to take Lamaze training, have their husbands present during labor and delivery, and use pain control techniques during labor.

4. Marital Status

Marital status is another significant predictor of prenatal self-care practice. Being single or unmarried can be a barrier to self-care practice (Ahmed et al., 1990; Young, McMahon, Bowman, & Thompson, 1989). Petitti et al. (1990) claimed that married mothers are more likely to start their prenatal care earlier in the first trimester, as compared to single mothers. Lia-Hoagberg et al. (1990) suggested that single or

unmarried mothers might not receive support from their partners to participate in the prenatal care. This is consistent with Phensuwan's findings (1997) that 17 of 81 Thai pregnant women who had inadequate prenatal care were divorced, separated or widowed. With respect to the birth period, if there is an individual present who is known to the laboring woman, it makes a difference to how she feels and copes with labor. The presence of a support person has been shown to reduce the need for medical and surgical interventions among laboring women (Kennell, Klaus, McGrath, Robertson, & Hinkley, 1991). In addition to providing support and comfort, support persons may assist them with breathing patterns and interpret their actions or requests.

However, it is common practice in Thai public hospitals not to permit a woman's husband or other family members to be present at the birth. In this study, marital status is recorded in order to assess its effects on the yoga program and effectiveness outcomes.

5. Trait Anxiety

Anxiety is a psychological and physiological response to a real or perceived threat (Greene, 1997). Anxiety may be either acute (state anxiety) or chronic (trait anxiety) (Spielberger, 1983). In the classic work on anxiety for nursing, Peplau (1963) identified four levels of anxiety: mild, moderate, severe, and panic. Mild anxiety means that the person's abilities are enhanced. Moderate anxiety sees the person becomes more introspective and less aware of the environment. Severe anxiety means that the person loses the ability to focus on details of immediate concern and focuses only on details of specific concern. Panic anxiety means that the person experiences apprehension, worry, fear, or terror and senses impending doom.

Anxiety manifests itself in every aspect of a person's being and its manifestations include the cognitive (confusion, poor concentration, or ability to focus only on immediate concerns), the affective (apprehension, fearfulness, or dread), and the physiological (shortness of breath, insomnia, cardiac palpitations, tension, and fatigue) (Phillips & Morrow, 1998). Physiological manifestations are mediated primarily through the sympathetic nervous system (Rauch & Rosenbaum, 1995).

The pregnant state not only renders a woman more vulnerable to a variety of biological threats, it may also bring psychological stress. In a review by Levin and DeFrank (1988) it was suggested that experiencing stressful events is predictive of preterm delivery and antepartum complications and that anxiety is linked to both antepartum and intrapartum complications. Teixeira, Fisk, and Glover (1999) presented a direct demonstration of possible biological outcomes in a recent study on 100 women undergoing ultrasonography in the approximately 32nd week. It was shown that both state anxiety and trait anxiety were significant with adverse changes in the Doppler indices of uterine blood flow. In addition, a pregnant woman is the environment for the developing fetus; psychological alterations or mental disorders may further affect the fetus. Indeed, there is substantial evidence that maternal stress is associated with premature delivery and lower birth weight adjusted for gestational age and with a smaller head circumference (Copper et al., 1996; Dunkel-Schetter, 1998; Lou et al., 1994; Wadhwa, Sandman, Porto, Dunkel-Schetter, & Garite, 1993). The latter finding may reflect suboptimal brain development and may be a predictor of impaired cognitive development (Hack et al., 1991). One previous study investigated the effect of stress during pregnancy on the postnatal development of the human infant (Van den Bergh, 1992). Measures of general anxiety in the third trimester of

pregnancy were positively correlated with a difficult temperament of the infant at 10 weeks and 7 months after birth, but were unrelated to infants' mental or motor development. Therefore, pregnancy is a major life transition requiring adaptation of many kinds.

Huizink and colleagues (2004) studied nulliparous pregnant women with a normal risk status. This was in order to investigate the structure of specific fears and worries related to pregnancy ('pregnancy anxieties') in the course of pregnancy and to differentiate pregnancy anxiety from general anxiety and depression. The results revealed that a three-factor model of pregnancy anxiety was found by means of confirmatory analysis, these being 'fear of giving birth', 'fear of bearing a handicapped child', and 'concern about one's appearance'. Measures of general anxiety and depression explain only a small part of these fears. Thus, pregnancy anxiety should be regarded as a relatively distinctive syndrome.

Waldenstrom (1999) studied the association between women's overall experience of labor and birth and a range of possible explanatory variables in a group of 1,111 women who participated in a birth center trial. The results found that anxiety, pain, and having a first baby were associated with a negative experience. The involvement in the birth process (perceived control) was associated with a positive experience. The results suggest that pregnancy and birth are events that change many perspectives of a woman's life and have potentially important implications for a woman's health, well-being, and social roles (Striegel-Moore, Goldman, Garvin, & Rodin, 1996; Yali & Lobel, 2002).

According to Spielberger and Rickman (1990) anxiety also refers to relatively stable individual differences in anxiety-proneness as a personality trait. People who

have high trait anxiety are most likely to perceive stressful situations as being personally dangerous or threatening and to respond to such situations with rises in state anxiety. The stronger the anxiety trait, the more often the individual has experienced state anxiety in the past and the greater the probability that more intense state anxiety will be experienced in threatening situations in the future. Furthermore, trait anxiety can be thought of as a worldwide phenomenon and one that an individual uses when coping with situations in his or her environment (Spielberger, 1983). Trait anxiety influences performances; those individuals with high trait anxiety will attend more to information related to state anxiety (Hardy, Jones, & Gould, 1996). Some research areas have indicated that individuals with high trait anxiety who are state anxious attend to threat related information, while individuals with low trait anxiety who are state anxious will not attend to threat related information (MacLeod, 1990). However, those individuals who are low trait anxious and experience high state anxiety would find it facilitates achieving peak performance in sport or athletic practice and competition. Those individuals who are high trait anxious and experience state anxiety will find it debilitating to their performance (Hardy et al., 1996). Based on the interactive effects of physiological arousal and cognitive anxiety upon performance, this can explain how physiological arousal can influence performance as a result of the individual's interpretation of their physiological symptoms. As cognitive anxiety increases it will be beneficial to performance at low levels of physiological arousal but it will have a detrimental effect at high levels of physiological arousal (Hardy et al., 1996). Moreover, when cognitive anxiety is at a low level, changes in physiological arousal have little effect upon performance. However, as cognitive anxiety increases physiological arousal can have either a

positive or negative effect on performance depending on how much arousal there is. When physiological arousal levels are too high there is a steep drop in performance, which can only be reversed by a reduction in physiological arousal (Humara, 2001). Thus, trait anxiety allows for dispositions to respond to psychological stress and, because it is considered to be relatively stable, it is usually only used at one point in time assessment or may not be used at all (Hundley, Gurney, Graham, & Rennie, 1998). These ideas may be controversial for some studies in the phenomena of the pregnant state and childbirth experience.

Hundley and colleagues (1998) undertook a comparative survey of women's priorities for intrapartum care, using a self-completing questionnaire at two intervals, at 34 weeks gestation and 19 days postpartum. The questionnaire incorporated the full 40 items of the State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1970). The results reveal that regardless of their state (136 nulliparous women and 81 parous women), women had significantly lower A-Trait scores postnatally than antenatally, when compared over a relatively short time period. Differences between nulliparous and parous women were found where the time lapse between completing the scales was more than 45 days. For nulliparous women significant differences in A-trait scores were still evident in the 45-56 day interval, but not in the later interval of 57-91 days. Parous women appeared to follow the opposite trend; however, but the numbers were considerably smaller. The findings suggest that the STAI may not be stable around the time of delivery. In particular, the test-retest reliability of the STAI A-Trait scale appears to be quite low. One possible explanation for the instability of the scale around the time of delivery is that many of the questions may not be applicable to women in the later stages of pregnancy or mothers with young babies. For example, questions

such as 'I tire quickly' and 'I feel rested' are likely to result in incorrectly high levels of anxiety for these women. Therefore, the experience of pregnancy and childbirth appear to upset the equilibrium and results in inconsistencies with the STAI. This is congruent with a small Australian study in the 1970s, which found similar changes in trait anxiety from late pregnancy to the postpartum period (Astbury, 1980). These findings were attributed to a failure on the part of subjects to discriminate between a current state and a general state of feeling.

Bielawska-Batorowicz and Machala (2001) explored the intensity of fear of labor and its changes over the course of the first and subsequent pregnancy, as well as its relationship to state trait anxiety. The conclusion of the study reveal that fear of labor is highly correlated to state trait anxiety in women with and without previous labor experience. It seems that those prone to anxiety are also prone to express more fear of labor across the course of gestation, or it is quite likely that intense fear of labor might be connected with some personality trait, i.e. trait anxiety. That should be considered in prenatal preparation.

In the current study anxiety was not a primary outcome to be evaluated, but rather a factor which was to be measured as a possible explanation for shifts in women's priorities for intrapartum care, thus increasing women's choice and control over the process of childbirth. Therefore, trait anxiety will be one of the control variables in this study.

6. Pain Medication

A number of opioid drugs can be used systemically to provide maternal analgesia during labor. Each of these drugs exhibits morphine-like action by binding with opioid receptors in the Central Nervous System. In general, the opioids produce

maternal analgesia without loss of consciousness by raising the pain threshold and dampening pain perception. Maternal side effects include drowsiness, mental clouding, and decreased gastric motility and emptying. Although opioids may prolong latent labor by altering uterine activity, clinical evidence suggests that during active labor, therapeutic doses of narcotics have no effect on contractions and may actually shorten labor by decreasing the pain related endogenous stress response (Berg & Rayburn, 1992). In this study, subjects observed from the labor record how much of the prescribed pain medications they had actually taken in their labor and birth.

7. Quantity of Yoga Practice

One of the considerations in intervention effectiveness is to determine the consistency of implementation. Inconsistent implementation of the intervention in the field setting presents a threat to the validity of the conclusions that can be made from a study of effectiveness. Inconsistency in an intervention may result in differences in how much the intervention actually impacts on the clients. For example, some clients in the experimental group may receive more or less of the intervention (Sidani, 1998). In turn, these differences lead to variability in the achievement outcomes among the clients in the experiment. This reduces the reliability of the statistical measures used to detect the significance of the effects of the intervention.

Quantity refers to the amount, frequency, and duration of an intervention to produce the expected changes in outcomes (Sechrest, Ametrano, & Ametrano, 1983). For instance, listening to relaxation music for 20 minutes (i.e., amount), once a day (i.e., frequency), and as necessary (i.e., duration: unlimited), is designed to relieve anxiety. Another example is the stress management techniques of five group sessions. Each session lasts 60 minutes (i.e., amount), for one session per week (i.e., frequency)

over a total of five weeks (i.e., duration) (Sidani & Braden, 1998). Thus, the quantity for some interventions may vary in amount, frequency, or duration, such as the amount of a counseling session may be fixed at one hour, but the frequency and duration of counseling may differ among clients (Sidani & Braden, 1998).

Kishiyama and colleagues (2002) studied the possible effects of yoga on cognitive functions in multiple sclerosis (MS) by setting up six-month-long classes that met for 90 minutes once a week. Five participants completed this program. The compliance data from each person's log demonstrates that on 56.9% of the study days, yoga was practiced for an average of 33.8 minutes a day. In a pilot study, twelve older female caregivers of dementia patients participated in a six-session manualized yoga-meditation program designed to help caregivers cope with stress. The results revealed statistically significant reductions in depression, anxiety, and an improvement in perceived self-efficacy. The averages of the minutes devoted to the weekly yoga-meditation practices were significantly associated with a reduction in depression (Waelde, Thompson, & Gallagher-Thompson, 2004).

In conclusion, this study used a yoga program that specified the quantity of an intervention. This was based on the theoretical framework underlying the study and took into account the findings of previous effectiveness studies. The program was made up of six 60-minute sessions. In addition, the clients were asked to practice at home at least three times per week from the 26-28th to the 37th week of gestation. The quantity of yoga practice is also identified as one of the continuous variables in the statistical analysis.

To sum up, pregnancy and childbirth experience are the complex phenomena, which are differentially influenced by multiple factors. These variables may explain

not only biological variation in the frequency or intensity of nociceptive stimulation, but also some of the factors that influence a woman's perception and subjective interpretation of such stimuli. The individual characteristics, which could have influenced the achievement of the expected outcomes of this program: maternal age, education, income, marital status, and trait anxiety were randomly assigned in equal numbers into the experimental and control groups on starting the program. In addition, the quantity of yoga practice that would have an effect on maternal comfort during pregnancy, and pain medication during labor were the confounding variables of the study. These variables influenced outcomes indirectly and affected the health behavior through behavior-specific cognition.

Conclusion

The literature review clearly provided evidence that the yoga philosophy is in accord with and supports the theoretical basis of the Yoga-Sutra of Patanjali and Kolcaba's theory of comfort in terms of health, well-being, and harmony, in relation to multidimensional phenomena such as pregnancy and childbirth. All of them have been used to provide guidelines, rationales and a theoretical basis for the study being described. However, the literature review relating to the study of the effect of yoga in the field of maternal and child health nursing indicates that there is limited literature available. Thus, this study was conducted in order to examine the effects of using a yoga program during pregnancy on maternal comfort, labor pain, and birth outcomes.