นิพนธ์ต้นฉบับ

ผลของโปรแกรมโยคะต่อความสุขสบายของมารดาในระยะตั้งครรภ์@

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Effect of a Yoga Programme on maternal comfort during pregnancy

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Abstract:

Objectives: *To examine the effects and the quantity of a Yoga Programme practice on maternal comfort during pregnancy.*

Materials and methods: *A randomised controlled trial (RCT) was conducted using the 74 primigravid women who were divided equally into a treatment (n = 37) and a control group (n = 37). The Yoga Programme comprised a series of six, one-hour practice sessions at the 26-28th, 30th, 32nd, 34th, 36th, and 37th weeks of gestational age. A Maternal Comfort Questionnaire (MCQ) and Visual Analogue Scale (VASTC) were used to collect the data for maternal comfort. A Yoga Practice Record Form was used for recording the frequency and duration of yoga practice.*

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Results: *Repeated measurement analysis of variances (ANOVA) (split-plot design) revealed a significant difference in maternal comfort over time; calculated using MCQ,* $F_{(2, 144)} = 60.75$, $p<0.001$ *and by VASTC,* $F_{(5, 360)} = 28.73$, $p<0.001$. *Both groups showed an actual decrease in comfort but the comfort scores of the yoga group were consistently higher than that of the control group. However, there was no significant relationship between maternal comfort and the frequency and duration of the yoga practice,* $F_{(2, 36)} = 1.902$, $p = 0.165$.

Conclusion: *A yoga programme of 30 minutes practice at least three times a week over 10 weeks of yoga practice is an effective complementary means for inducing maternal comfort. It could be used in clinical practice in order to improve the quality of care during pregnancy.*

Key words: *Yoga, maternal comfort, pregnancy*

บทคัดย่อ:

วัตถุประสงค์: *เพื่อศึกษาผลของโปรแกรมโยคะและความสัมพันธ์ระหว่างปริมาณ ของการฝึกปฏิบัติโยคะต่อความสุขสบายของมารดาในระยะตั้งครรภ์*

วัสดุและวิธีการ: *เป็นการศึกษาเชิงทดลองที่มีกลุ่มเปรียบเทียบ (randomized controlled trial) โดยมีกลุ่มทดลองเป็นหญิงครรภ์แรก 37 ราย กลุ่มควบคุม 37 ราย โปรแกรมการฝึกปฏิบัติโยคะครั้งละ 1 ชั่วโมง เริ่มตั้งแต่อายุครรภ์ 26-28 สัปดาห์ และเมื่ออายุครรภ์ 30, 32, 34, 36,37 สัปดาห์ รวม 6 ครั้งตามลำดับ ทำการเก็บรวบรวมข้อมูลจากแบบสอบถามภาวะความสุขสบายและแบบประเมินภาวะความสุขสบายโดยมารดา ร่วมกับแบบบันทึกการปฏิบัติโยคะด้วยตนเอง*

ผลการศึกษา: *การวิเคราะห์ความแปรปรวนซ้ำโดยใช้สถิติ ANOVA (split-plot design) พบว่า มีความแตกต่างของค่าเฉลี่ยคะแนนความสุขสบายของมารดาระหว่างครั้งตามที่โปรแกรมกำหนดอย่างมีนัยสำคัญทางสถิติ (p<.001) ทั้งสองกลุ่มมีค่าเฉลี่ยคะแนนความสุขสบายลดลง แต่กลุ่มทดลองมีค่าเฉลี่ยคะแนนความสุขสบายมากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ (โดย MCQ,* $F_{(1, 72)} = 4.04$ *p<.05 และโดย VASTC,* $F_{(1, 72)} = 11.69$ *p<.01) อย่างไรก็ตามไม่พบความสัมพันธ์ระหว่างปริมาณของการฝึกปฏิบัติโยคะกับความสุขสบายของมารดา*

สรุป: *โปรแกรมการฝึกปฏิบัติโยคะวันละ 30 นาที อย่างน้อยสัปดาห์ละ 3 วัน จะลดความรู้สึกไม่สุขสบายในระยะหลังของการตั้งครรภ์เพิ่มขึ้น โยคะจึงเป็นทางเลือกหนึ่งของการพัฒนาคุณภาพของการดูแลในระยะตั้งครรภ์.*

คำสำคัญ: *โยคะ, ความสุขสบายของมารดา, การตั้งครรภ์*

Introduction

During pregnancy, women may experience a wide variety of discomfort, which often is not an isolated symptom but a whole range of integrated problems, with one sometimes perpetuating another.[1] Recent well-controlled human studies indicate that pregnant women with high stress and anxiety levels are at increased risk of adverse perinatal outcomes.[2] During exposure to a stress situation, the whole stress-regulating system is activated, causing various hormones including the corticotropin-releasing hormone (CRH), adrenocorticotropin-releasing hormone (ACTH), cortisol and noradrenaline to be released into the circulation. Pregnant women respond differently to identical stressful stimuli depending on their previous experiences, genetic factors, social support, or personality traits.[3] For the primigravid women as the pregnancy progresses, physical changes associated with anxiety regarding labour and fetal outcome or worries about changes in their personal life due to the pregnancy and childbirth potentially worsen the stress response and lead pregnant women to have greater discomfort.[4]

Kolcaba has described comfort as a dynamic outcome of care and classified comfort as *"the immediate state of being strengthened when the needs for relief, ease, and transcendence are met in physical, psychospiritual, social, and environmental contexts of experience."*[5-6] Kolcaba's Comfort Theory also suggests that the comfort needs of patients in specific health care situations are interrelated and that the interventions should be targeted to complex needs that cannot be met by the patients or their existing support systems. Enhancing comfort, therefore, involves engaging in health-seeking behaviors (HBSs), which in the case of pregnant women involves identifying interventions that enhance their comfort.

Interventions should be created individually using a holistic approach balancing mind, body and spirit. Yoga is a one solution from a range of alternative therapies and is considered a challenging means to enhance maternal comfort during pregnancy. The "Five Sheaths of Existence" of the Kosha model of yoga describes health as *"the balance and awareness within an open, free-flowing, living system of interaction and interdependence between all aspects of the human experience. Health is optimized when the individual maximizes their awareness and integrates all five of the allegorically porous, thin bodies of human experience."*[7] Through the practice of yoga, the mind, body and emotions unite to create a sense of inner peace and harmony.

Based on the yoga perspective, pregnancy has a profound impact on women. It is a time of great physical adaptation and may be causing the discomfort of pregnancy. For example, around 50% of all pregnancies incur pain in the pelvis and/or the lower back, which may persist, or even arise, after delivery.[8] It is also a time of emotional adaptation, which they will probably find that they have less control over them. This bio-psychosocial-spiritual experience needs not the medical intervention but also the holistic approach to ease, relief, or transcendence the problem of pregnant discomfort. The practice of yoga during pregnancy can improve and maintain health and well-being. The synchronized movements that are done slowly and meditatively and combined with breath awareness relieve bad posture, tones the muscles without straining them, promote healthy blood flow and reduce poor circulation and sluggish that can combine to form a build-up of toxins in the body, combats fatigue, balances the neuro-endocrine system, stabilizes emotions, and reduces stress. Thus, the physical body is flexed and strengthened in order to be stillness of the body and mind, enabling the pregnant women to explore the deeper and more successful in liberating their instinctive potentials.[9-10] In addition, the practice of yoga during pregnancy aims to allow the expectant mother to connect with her unborn child and also help her to prepare for the birth as she masters the art of relaxation and learns to trust her body's ability to give birth.

To date, there is only limited study of yoga in the area of maternal and child health nursing. Narendran and colleagues have studied the efficacy of yoga on the successful outcome of pregnancies.[3] 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. Their 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 ≥ 2,500 grams was significantly higher in the yoga group (n = 169) compared to the control group (n = 166) and preterm labour 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. In addition, the previous study did not inform whether variations in practicing yoga contributed to the pregnancy outcomes.

The specific aim of this study was to determine the effect of a yoga Programme on maternal comfort during pregnancy in first time mothers by comparing an experimental and control group. The quantity of yoga practiced was also examined to demonstrate the contribution of frequency and duration on maternal comfort during pregnancy.

Materials and methods

A randomised controlled trial (RCT) was conducted between January, 2005 and February, 2006. First time pregnant women were recruited in two public hospitals in Southern Thailand. The participants were at least 18 years old; able to communicate and write in the Thai language; had no serious illness or high-risk complications during pregnancy; had attended antenatal care from the start or at least the second trimester of their pregnancy; and had no prior experience of practicing yoga. The study was approved by both the Ethics Research Committee of the Faculty of Nursing at Prince of Songkla University, and also the Ethics Research Committees at the study sites. All participants involved in the study provided a written informed consent.

Pregnant women who met the selection criteria were randomly assigned to either one of the two groups using a computerised-minimization programme that automatically controlled for maternal age, marital status, education, income, and anxiety traits.[11] Thus, extraneous variables were checked to ensure the homogeneity of the sample groups.

The Experimental Intervention

Pregnant women in the yoga intervention group received a series of six, 60-minute practice sessions at the 26-28th, 30th, 32nd, 34th, 36th, and 37th weeks of gestational age. The Yoga Programme was a combination of two elements: educational activities giving a brief description of basic anatomical structures related to pregnancy and yoga explaining the concepts related to each session's theme. Yoga *asanas*, *pranayama*, *yoga nidra* (a deep relaxation technique), *dhyana* (meditation), and a combination of *chanting mantra* (a word or series of words chanted aloud or silently to evoke spiritual qualities) were practiced harmoniously and in an orderly manner 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. Additionally, the pregnant women were provided with a booklet and tape cassette for self-study use, which explained the principles and benefits of each yoga practice and asked the mothers to practice at home at least three times a week starting after the first yoga session and continuing until their sixth session. It was expected that each subject would practice yoga for a period of 10-12 weeks. Subjects were informed that they could practice more than three times a week. Compliance in both groups was ensured through the research team making frequent telephone calls and an additional request for subjects in the experimental group to maintain a strict record in a diary.

Instrumentation

The Maternal Comfort Questionnaire (MCQ) was a modification from The General Comfort Questionnaire.[5-6, 12] The positive and negative items were generated from two-dimensional grid of the three states of relief, ease, and transcendence and the four contexts of physical, psychospiritual, social, and environment as described by the theory of holistic care. The items were presented with a Likert-type format, ranging from "strongly agree" (6) to "strongly disagree" (1) and the overall possible range of score was 35-210, the higher scores indicating higher comfort. The MCQ was used to measure experiences at the beginning of the study (26th - 28th week) then at the 34th and 37th weeks of gestational age.

The Visual Analogue Scale to Total Comfort (VASTC) modified from the Visual Analogue Scales (VASs) for Comfort was used to assess the expected outcome over six time periods during pregnancy. The scores ranged from 0-100 and again higher scores indicated higher comfort.[5-6, 12]

Since subjects in the experimental group were allowed to practice yoga more or less than minimum requirement to handle both compliant and non-compliant subjects, it is necessary to collect data regarding frequency (time per week) and duration (minutes per time for each time) of yoga practice for subsequent analysis. A Yoga Practice Record Form-a self-report diary of frequency and duration of yoga practice was distributed to subjects in the experimental group. This effort was made in order to examine whether the variation in quantity of yoga contributed to maternal comfort. Scores were rated as:

yoga practice of less than three times per week was scored = 0; three times per week = 1; 4-5 times per week = 2, and 6-7 times per week = 3. The duration of each yoga session 0-30 minutes was scored = 0; 31-45 minutes = 1; 46-60 minutes = 2; and more than 60 minutes = 3.

The State Trait-Anxiety Inventory, a trait anxiety subscale, was used to assess anxious personality attributes that may have confounded the outcome variables.

Data analysis

Descriptive statistics and frequency distributions were generated for the pregnant women's demographic variables and anxiety traits. Daily records for the frequency and duration of yoga practice were computed on a weekly basis. Independent-sample *t* tests and X^2 or Fisher's exact tests were applied to determine if there were differences in any demographic variables and anxiety trait scores between the experimental and control groups.

Repeated measures analysis of variances (ANOVA) was used to determine if changes in maternal comfort scores occurred over time and whether these changes differed between the groups. Bonferroni comparisons were also employed in the analysis for pair comparisons to control for inflating Type I errors. Regression analysis was used to determine the quantity of yoga practice in producing the desired changes in the maternal comfort. No adjustments were made for missing data. Therefore, the cohort for each analysis was dependent on the largest complete set of data across the groups. A p-value of less than 0.05 was considered statistically significant.

Results

Sample demographics

Seventy-four primigravid women were included in this analysis. No significant differences were found in any of the demographic data between the two groups ($p>0.05$) (Table 1). There was no difference between the anxiety trait score of the experimental group (mean = 60.68 ± 7.13) and the control group (mean = 60.35 ± 6.96).

Table 1 Numbers and percentages of subjects according to demographic data

Characteristic	Experimental group		Control group		X^2
	Number	%	Number	%	
Maternal age (year)					
18-19	10	27.0	12	32.4	0.80
20-35	27	73.0	25	67.6	
Marital status					
Separated/divorced	3	8.1	2	5.4	1.00
Married	34	91.9	35	94.6	
Education level					
≤Grade 12	27	73.0	29	78.4	0.79
>Grade 12	10	27.0	8	21.6	
Religion					
Buddhist	24	64.9	19	51.4	0.38
Muslim	12	32.4	18	48.6	
Christian	1	2.7	0	0.0	
Income (Baht)					
2,000-5,000	12	32.4	14	37.8	0.74
5,001-10,000	19	51.4	17	46.0	
10,001-15,000+	6	16.2	6	16.2	
Maternal trait anxiety					
score 40-59	18	48.6	18	48.6	1.00
score 60-80	19	51.4	19	51.4	

Change in maternal comfort over time

Mean MCQ values of maternal comfort in the experimental group were 155.22, 146.59, and 141.59, respectively. The mean values in the control group were 152.81, 140.97, and 134.68 respectively (Table 2). Both groups showed a decrease in their levels of maternal comfort. However, the maternal comfort scores of the experimental group were consistently higher than those of the control group (Figure 1). Repeated measures ANOVA revealed that there was a significant change in maternal comfort of subjects in the experimental group ($F_{(1, 36)}$ = 6,033.19, p<0.001). Post-hoc pair comparisons displayed a significant difference between scores of Time 1-Time 2 (p<0.01), and Time 1-Time 3 (p<0.001). ANOVA (split-plot design) was computed to test the effects of group, time, and interaction (group by time). It emerged from this that there were significant differences with group ($F_{(1, 72)}$ = 4.04, p<0.05 effect size = 0.05) and time ($F_{(2, 144)}$ = 60.75, p<0.001, effect size = 0.02), but no interaction effect was found (Table 3).

Table 2 Means and standard deviations of maternal comfort during pregnancy measured by the maternal comfort questionnaire (MCQ)

Data points	Maternal comfort during pregnancy				
	Yoga group		Control group		t-test
	M	SD	M	SD	
26-28 weeks (Time 1)	155.22	19.47	152.81	17.32	0.561
34 weeks (Time 2)	146.59	9.41	140.97	8.69	2.671**
37 weeks (Time 3)	141.59	9.59	134.68	7.90	3.386**

**p < 0.01

Table 3 Analysis of variance for maternal comfort during pregnancy measured by the maternal comfort questionnaire (MCQ)

Source of variation	SS	df	MS	F
Between-subject effects				
Group	1,377.52	1	1,377.52	4.04*
Residuals	24,546.70	72	340.93	
Within-subject effects				
Time	9,587.38	2	7,024.51	60.75***
Time* group	199.79	2	146.39	1.27
Residuals	11,362.16	144	115.62	

*p < 0.05, ***p < 0.001

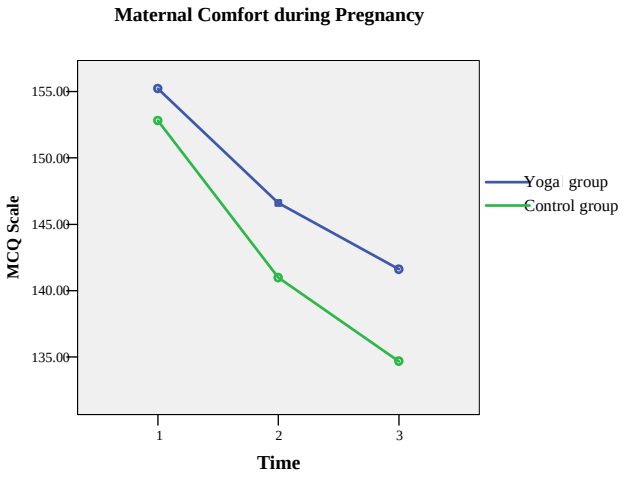

Figure 1 The mean maternal comfort during pregnancy by MCQ decreased significantly at each of three data points in both groups but comfort was significantly higher in the yoga group compared to the control group (N=74).

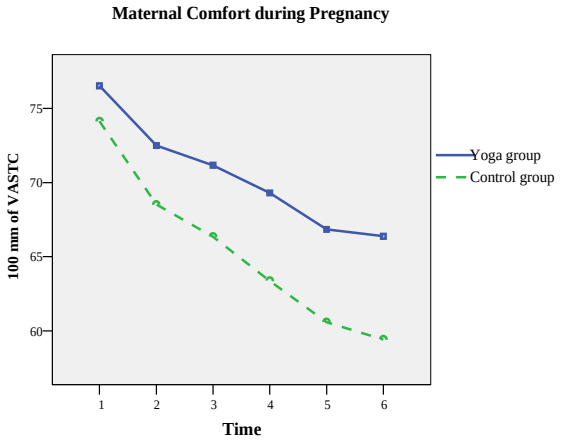

Figure 2 The mean maternal comfort decreased significantly in both groups, but comfort was significantly higher in yaga group compared to the control group (N=74).

Table 4 Means and standard deviations of maternal comfort during pregnancy measured by the visual analogue scale to total comfort (VASTC)

Data points	Maternal comfort during pregnancy				t
	Yoga group		Control group		
	M	SD	M	SD	
26-28 weeks (Time 1)	76.51	6.23	74.14	11.80	1.084
30 weeks (Time 2)	72.49	7.89	68.51	9.11	2.005*
32 weeks (Time 3)	71.16	8.80	66.35	10.77	2.104*
34 weeks (Time 4)	69.30	9.14	63.38	9.11	2.790**
36 weeks (Time 5)	66.84	8.31	60.59	11.46	2.683**
37 weeks (Time 6)	66.38	6.08	59.43	10.80	3.410**

*p<0.05, **p<0.01

Table 5 Analysis of variance for maternal comfort during pregnancy measured by the visual analogue scale to total comfort (VASTC)

Source of variation	SS	df	MS	F
Between-subject effects				
Group	2,825.23	1	2,825.23	11.69**
Residuals	17,398.51	72	241.65	
Within-subject effects				
Time	7,955.13	5	1,784.35	28.73***
Time* group	261.37	5	58.63	0.94
Residuals	19,937.17	360	62.11	

**p<0.01, **p<0.001

Table 6 Descriptive statistics for frequency and duration of yoga practice

	Frequency				Duration			
Variable	Max.	Min.	Mean	SD	Max.	Min.	Mean	SD
Quantity	19.33	9.67	14.48	3.00	19	11	14.66	2.18

Table 7 Regression analysis of quantity of yoga practice on maternal comfort

Predictor	R^2	Adjusted R Square	b	SE	Beta	t
Frequency	0.101	0.048	-0.862	0.709	-0.209	-1.216
Duration			1.795	0.977	0.316	1.838

$F_{(2, 36)} = 1.902$, p = 0.165

The results from the VASTC showed similar pattern of change to the results from the MCQ (Table 4). The level of maternal comfort declined as pregnancy advanced, but those of the maternal comfort scores of the yoga group were consistently higher than that of the control group (Figure 2). Subjects in the experimental group showed a significant change in the maternal comfort ($F_{(1, 36)}$ = 7,114.55, p<0.001), and the comparisons showed a significant difference between scores of Time 1-Time 4 (p<0.01), Time 1-Time 5, and Time 1-Time 6 (p<0.001). The findings revealed that there were significant differences with group ($F_{(1, 72)}$ = 11.69, p<0.01, effect size = 0.14) and time ($F_{(5, 360)}$ = 28.73, p<0.001, effect size = 0.29), but no interaction effect was found (Table 5).

Effect of the "quantity" of yoga programme

The descriptive statistics for the "quantity" of yoga practice are shown in Table 6. The score of the frequency and duration in minutes of yoga practice were ranged from 10 to 30 scores. There were no significant linear relationships between maternal comfort and the frequency and duration of yoga practice, $F_{(2, 36)}$ = 1.902, p = 0.165 (Table 7).

Discussion

Pregnant women in the experimental group had significantly higher comfort scores across the three times assessed by the MCQ, and the six times assessed by the VASTC during their pregnancy than did those in the control group even though their overall comfort was decreasing as the pregnancy progressed. The extent to which the change of comfort during their pregnancy is felt and how well the intervention programme works depend upon the development of self-awareness and the inner strength as a result of yoga practice. This programme was composed of yoga *asanas*, *pranayama*, *yoga nidra*, *dhyana* or meditation, and a combination of chanting mantra leading to a meditative state.

Yoga *asanas* were designed as a sequent set of postures, which work on the *anna-maya-kosha* or physical body. They improve the physical functions by stretching, twisting, and toning the muscles of the body resulting in relief of muscle tension and improvement of the circulation. They massage and squeeze the internal organs improving their function and tone keeping them regulated and balanced for the effective operation. The exercises also influence the endocrine gland secretion of hormones into the body by applying pressure to them and articulate the joints to remove any stiffness or joint pains. Thus, they can alleviate some of the common discomforts of pregnancy, such as, back or leg pain, sore or cramped muscles, and swelling caused by water retention.[9-10] Through the yoga practice awareness of the body and its function is created and the mind stabilised *(sthira)* so that it can distinguish the state of relaxation or calmness and tension or stress from the resting period between each pose. Moreover, the practice of chanting a mantra while holding a yoga posture affects the autonomic nervous system[13] allowing tension and emotions to ease (sukha) or release from the body.[7] A previous study comparing yoga with progressive muscle relaxation was undertaken in which the yoga intervention, over a 10 week period, accompanied the bodily postures that addressed mind-body breathing coordination, and the progressive muscle relaxation participants listened to a tape record voice of the yoga teacher guiding them through the relaxation. Following the intervention, yoga was found to be as effective as relaxation in reducing stress, anxiety, and improving the state of health. Yoga, however, was more effective than relaxation in improving mental health.[14]

Pranayama works linking through the prana-maya-kosha (vital or bioenergetic body) to the *Ananda-maya-kosha* (bliss body). From the yogic perspective, if energy flow is constricted or separated the mother and fetus could suffer. The benefits of pranayama are an increase supply of oxygen to the blood, which is important to the metabolic process of regeneration in the entire body, and retention of the breath; needed for vitality and to raise the energy levels of the body-mind. In addition it also calms the emotions and clears the mind. A study of *pranayama and shavasana*, findings showed that their practices may be valuable in patients who have benign ventricular ectopics as an adjunct to other medical therapy.[15]

Yoga nidra is a specialized yoga practice that generates deep relaxation. *Shavasana* is the most important yoga posture in "letting everything go" as if one were dead. At the beginning

it works to calm the body and then focuses the mind in preparation for the posture to follow. Shavasana posture allows the energy that was created and released in the yoga postures to flow freely through the body allowing it to heal and be nourished, thus, this pose releases stress and tension from the body or profoundly relaxes the individual.[16] The study by Sharma, Mahajan and Sharma concluded that a person practicing *shavasana* can successfully reduce the physiological effects of stress.[17]

Dhyana or meditation is the state attained in with the mind becomes concentrated and focused with a deep sense of relaxation. This practice either by itself or in conjunction with *asana* and *pranayama* reduces the excessive thinking or 'tunes out' the extraneous sensory stimuli or withdraws the senses from the things that stimulate them *(pratyahara)* and will bring the mother to achieve relaxation and a heightened sense of spirituality. Waelde, Thompson, and Gallagher-Thompson studied the effects of yoga-meditation practice on dementia caregiver's stress levels, with the result that there was an improvement in their depression.[18] Therefore, in this current study, pregnant women could learn how to monitor the flow and effect of their thoughts, and how to direct their mind towards calmness despite the stress of outer circumstances.

In summary, all aspects of yoga practice lead to a state of deep relaxation in which the mind and body experience calmness. The harmonious flow of prana through chakra (a vortex of energy or a center of energy located in the subtle body where the subtle nerve channels converge like the spokes of a wheel) as a result of pranayama and deep relaxation practice lead to a balance of the five sheaths of human existence. The state of the body goes through many fluctuations that can cause instability and discomfort during pregnancy. The provision of a strategy using yoga training techniques in antenatal care to help women to have control of themselves during their pregnancy and also to be more active in their experience to develop ease and stability will meet one need and as a result other needs can be positively affected and total comfort enhanced. Yoga can help the pregnant woman by giving her the tools that she will need to have an enjoyable pregnancy.

Other possible explanations for the effect of yoga that could lead to a state of deep relaxation that have been documented in many studies.[14, 19-21] These effects, it has been hypothesised, may have similar mechanisms that operate in pregnant women through having direct effects on their nervous system and indirectly on the hypothalamus-pituitary-adrenal cortex system (HPA) axis[3] resulting in pregnant women who have had stress relief tending to have a higher comfort level.

The result of the current investigation shows that the variance in the maternal comfort was not accounted for by its linear relationship with frequency and duration of yoga practice. The evidences for a relationship between the intervention strength of yoga practice and outcomes show a diversity of results. The therapeutic and relaxation efficacy of yoga can be seen by looking at a previous study of yoga and meditation interventions made of stress in dementia caregivers who were advised to undertake an average weekly yoga-meditation practice set at 30 minutes of practice a day at least six days per week for a total of 180 minutes per week. The research demonstrated that adherence to the programme was significantly associated with improvements in depression. Although the results showed improvement in the expected outcomes this was in spite of the fact that caregivers averaged fewer than the suggested 180 minutes of practice for each week in the intervention. Likewise, the number of sessions attended was also significantly associated with the number of minutes of weekly home practice.[18] Another study of a yoga on the investigation of non-directive somatic arousal, utilising heart-rate data of trained and novice yoga practitioners before, during and following an auditory distraction in shavasana. The intervention consisted of a one and a half hour yoga sequence. No difference was found between trained and novice yoga practitioners.[22] Additionally, in a study of yoga and exercise in multiple sclerosis patients though its improvement was in secondary measures of fatigue compared to the control group, generally found there was no relative improvement of cognitive function in either of the intervention groups.[23] We concluded the current findings, related to the relationship of maternal comfort and frequency and duration of yoga practice, are inconsistent with previous findings and should be further studied or replicated in a different group and location.

Strength and limitations

The strengths of this study include a randomisation procedure, equal group size, use of recommended outcome measures, good adherence and follow-up, use of masked assessors, and methodical development of yoga protocols. There are, however, some limitations. Recruitment of subjects was actively performed over a period of 12 months, which resulted in only 74 eligible and willing subjects. Factors that may have influenced the difficulty in recruitment included strict eligibility criteria and extensive time commitment of the participants. This suggests that recruitment for such studies is challenging and therefore may require creative recruitment procedures and the firm commitment of clinical personnel to ensure subject participation.

A demographic limitation on this study was that the most of the women were at grade 12 or lower of education. Replication in a more diverse sample would be better and also considering additional variables, such as, socioeconomic status, education level, motivation and lifestyle, to determine the effect of environmental factors that have not been considered here.

The current study was conducted in only two settings making the generalisability of the findings limited. Subjects in this programme were shown to be free of medical and obstetric complications but it is possible that some of the benefits of the yoga exercises may be found in pregnancies that are complicated by disorders such as diabetes and asthma.

Conclusions

Yoga is a beneficial practice minimising many of the common discomforts of pregnancy. Results from the study indicate that yoga *asanas*, *pranayama*, yoga *nidra*, *dhyana*, and a combination of chanting *mantra* improves maternal comfort over time and these findings are consistent with other research studies that report the positive effects of yoga. The results of this study can proceed with the reassurance that a structured and well-supervised yoga programme can lead to an improvement in the maternal mental and physical condition without untoward effects on maternal and fetal welfare. The result of this study do provide evidence that a structured and well-supervised yoga programme of 30 minutes at least three times a week over 10 weeks of yoga practice is an effective complementary means for inducing maternal comfort. It was statistically shown to be an effective measure and could be used in clinical practice in order to improve the quality of care during pregnancy. However, future studies should incorporate some subjective and objective outcomes of comfort into the study.

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