

## Yoga and Social Support Reduce Prenatal Depression, Anxiety and Cortisol

Tiffany Field<sup>1,2\*</sup>, Miguel Diego<sup>1</sup>, Jeannette Delgado<sup>1</sup> and Lissette Medina<sup>1</sup>

<sup>1</sup>Director of the Touch Research Institute, University of Miami Medical School, Florida

<sup>2</sup>School of Psychology, Fielding Graduate University, USA

### Abstract

Ninety-two prenatally depressed women were randomly assigned to yoga or a social support control group at 22 weeks gestation. The yoga group participated in a 20-minute group session (only physical poses) once per week for 12 weeks. The social support group (a leaderless discussion group) met on the same schedule. At the end of the first and last sessions, the yoga group as compared to the social support group reported less depression, anxiety, anger, back and leg pain, unlike the support group who did not show immediate effects. At the end of the treatment period, the yoga group and the support group did not differ and they both had lower summary depression (CES-D) scores, as well as lower negative affect and somatic/vegetative symptoms subscale scores on the CES-D and lower scores on the other depression measures (EPDS and POMS), lower anxiety (STAI) scores, lower anger (STAXI) scores and improved relationship quality scores. In addition, cortisol levels decreased for both groups after the sessions and at the end of the treatment period. Estriol and progesterone levels increased across the treatment period and decreased after the last session for both groups. Depression and anxiety levels also decreased for both groups at the postpartum period. Thus, this study suggests that yoga as compared to social support sessions may have greater immediate effects on depression, anger, back and leg pain, but that both yoga and social support had positive effects on depressed pregnant women over the longer term.

**Keywords:** Yoga; Prenatal depression; Anxiety

### Introduction

As many as 49% of pregnant women have reported depressive symptoms, especially ethnic minorities [1,2], lower income and unmarried women [3]. Prenatal depression contributes to prematurity [4], developmental delays [5], as well as behavior problems in childhood [6] and adolescence [7], highlighting the need for prenatal intervention.

Traditional treatments for depression have been underutilized in the case of prenatal depression for various reasons. For example, antidepressants have been used by a very small percentage (1-5%) of prenatally depressed women because of the mixed data on fetal and neonatal outcomes [8,9]. These studies have been limited by small sample sizes, uncontrolled study designs and unknown long-term medication effects. In addition, most women, even those already on antidepressants, have elected to stop taking antidepressants during pregnancy and have expressed a preference for the use of alternative therapies.

Different forms of psychotherapy including cognitive behavior therapy have also received mixed reviews [10-11] in addition to being unaffordable by most women. Interpersonal Psychotherapy (IPT) has been effective in at least one study on depressed pregnant women [12]. In this study, positive results were noted. The IPT group received 16 weeks of individual sessions, and a comparison group received the same number of sessions focused on parenting education. The IPT group showed significant improvement compared to the control group on 3 measures of depression including the Edinburgh Postnatal Depression Scale, the Beck Depression Inventory and the Hamilton Depression Rating Scale, and that group also had a lower attrition rate. Problems with this study included the lack of generalizability given that all the women were immigrants from Dominican Republic, and many of the women had been abused. The curves on the three depression scores in this study suggested that the significant decrease in depression scores had occurred by the 6<sup>th</sup> week of the treatment period. In a study by

our group, depressed pregnant women who received 6 weeks of Group Interpersonal Psychotherapy (one hour session once per week) showed increased positive affect and social relatedness; although negative affect also increased [1]. No studies could be found on the use of social support groups with depressed pregnant women.

Alternative therapies including massage therapy and yoga have also been notably effective. For example, moderate pressure massage therapy has decreased prenatal depression [1], as well as prematurity [13]. However, unless partners are willing to massage pregnant women, it can be a costly therapy.

Yoga has the advantages of being more affordable and being transportable, for example, being learned and practiced with a DVD. Several studies have reported positive effects of yoga on depression [14] and anxiety [15]. A few studies have reported positive effects of yoga on the well-being of pregnant women, including less stress, anxiety and pain [16], less discomfort [17], and less painful labor and less time in labor [18]. Yoga versus walking has led to fewer complications like pregnancy-induced hypertension with associated intrauterine growth retardation and a lower incidence of preterm labor and caesarean delivery [19]. Uterine artery resistance, which would limit transport of oxygen and nutrients to the fetus and lead to intrauterine growth delays and lower birth weight was also lower in that study. However, it

**\*Corresponding author:** Tiffany Field, Ph.D., Touch Research Institute, University of Miami School of Medicine, PO Box 016820, Miami, USA, 33101, Tel: (305) 243-6781; E-mail: [tfield@med.miami.edu](mailto:tfield@med.miami.edu)

**Received** August 21, 2012; **Accepted** September 28, 2012; **Published** September 30, 2012

**Citation:** Field T, Diego M, Delgado J, Medina L (2012) Yoga and Social Support Reduce Prenatal Depression, Anxiety and Cortisol. *J Yoga Phys Ther* 2:124. doi:10.4172/2157-7595.1000124

**Copyright:** © 2012 Field T, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

is not clear whether the benefits are derived from the physical postures, breathing, meditation and/or all the components of the yoga sessions.

The present study was suggested by the literature on yoga with pregnant women and our pilot data showing positive effects of yoga for pregnant women including decreased anxiety and depressed mood. A short yoga routine (20 minutes) was used because better attendance was expected, and following the study, it could be practiced at home on a daily basis [20]. The routine is limited to yoga poses that are appropriate for pregnant women, consistent with the previous studies conducted on yoga with pregnant women. The purpose of the present study was to compare the effects of yoga (physical activity) versus social support (verbal activity) on prenatal and postpartum depression. Most interventions for prenatal depression have been verbal (psychotherapy) versus physical interventions, although physical (yoga) interventions have been effective with depression [14]. The effects of these interventions on anxiety and cortisol levels were also explored because both anxiety and elevated cortisol have been comorbid with prenatal depression [21]. Finally, estradiol and progesterone levels were assessed as they have been notably elevated in depressed women and could potentially be lowered by prenatal intervention.

## Method

### Participants

The sample was comprised of 92 depressed pregnant women recruited from two prenatal ultrasound clinics at a large university medical center. The depressed pregnant women were randomly assigned to a yoga (n=46) or a social support group (n=46) based on a random numbers table (see Figure 1 for recruitment diagram). The recruitment criteria were: 1) depression on the Structured Clinical Interview for Depression (SCID); 2) being pregnant with one child; 3) an uncomplicated pregnancy with no medical illness; and 4) younger than 40-years-old, and no drug use (i.e., prescribed or illicit). Samples previously recruited at these clinics had a very low incidence (3-5%) of treatment for prenatal depression (i.e., psychotherapy or antidepressants), so these were not exclusion criteria. None of the women in the study were receiving other forms of treatment possibly

Variable	Group		P
	Yoga	Support	
Age	24.4 (4.7)	24.5 (5.02)	NS
Education	3.8 (4.1)	4.0 (1.0)	NS
SES	4.7 (.9)	4.7 (1.0)	NS
Ethnicity (%)			NS
Hispanic	60.0	49.0	
African American	38.0	50.0	
Non-Hispanic White	2.0	1.0	
Marital Status (%)			NS
Single	40.0	40.0	
Boyfriend	46.0	47.0	
Married	14.0	13.0	

**Table 1:** Means (and standard deviations in parentheses) on demographic variables for depressed yoga and support group pregnant women

because of their low income status, and none of the women reportedly had previously attended yoga or social support groups.

The sample included women ranging in age from 18-38-years-old of (M=24.9 years, SD=5.2). The women were primarily low income (based on the Hollingshead Index) and Hispanic or African-American women with a high-school education (the education scale indicated years of education beyond 8th grade). The groups did not differ on these variables (See Table 1 for the means of women's age, education, SES, ethnicity and marital status). The women were medically cleared by their obstetrician/gynecologist at the prenatal ultrasound clinics.

### Procedures

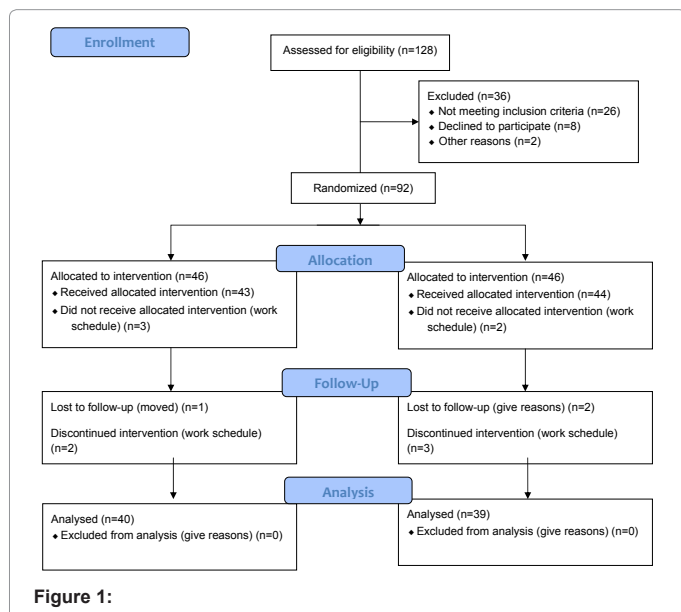
The women in the yoga group participated in 20-minute sessions once per week for 12 weeks. A trained yoga instructor led group participants through a routine that was specifically designed for women in their second and third trimester of pregnancy. This routine was outlined in a manual and videotaped for DVD demonstrations for the instructor and for the pregnant women. This routine included only basic sitting, kneeling and standing yoga poses as follows: spinal twist, table pose, cat/cow, kneeling balance, kneeling warrior, runner's stretch, stork pose, tree pose, eagle pose, warrior 1, warrior 2, reverse warrior, side-angle pose, triangle pose, sitting angular pose, cow's head pose, butterflies, and prayer position..

The treatment comparison group participated in social support sessions to control the possible effects of attention and social support gained by women in the yoga group and to have a comparison between the effects of verbal and physical activity on prenatal depression. These were leaderless group sessions (staff member attended but was silent) that featured free-flowing verbal interactions between the pregnant women which were recorded.

The yoga and social support groups were the same size and followed the same weekly schedule. Participants in both groups were paid \$20 for each session to compensate for expenses related to childcare and transportation. Assessments were conducted at the beginning of the treatment period (M=22 weeks gestation), at the end of the treatment period (M=34 Weeks gestation) and again postpartum (at approximately 1-3 weeks post-birth) by trained researchers who were blind to the group assignment and the study hypotheses.

### Measures

**Structured Clinical Interview Depression (SCID):** The women were given the SCID interview (research version) at the first assessment for the diagnoses of depression and anxiety disorder and to rule out



**Figure 1:**

bipolar disorder, schizophrenia and psychotic disorders. The women were diagnosed with dysthymia or major depression on the SCID based on DSM IV symptoms. The SCID was given by research associates following training and with continuing supervision by a clinical psychologist. In our experience (including a recent survey sample), the majority of the depressed pregnant women who attended the university ultrasound clinic were not taking anti-depressants and were not receiving other treatments for depression.

**The Center for Epidemiological Studies Depression Scale (CES-D):** The CES-D is a 20-item self-report measure that assesses current depression symptoms (over the past week) [22]. The symptoms include “depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, loss of energy, and disturbances of sleep and appetite” [23]. The Likert ratings include most of the time (6-7 days), occasionally, (3-4 days), some of the time (1-2 days) and rarely (less than a day). Each item is rated from 0 to 3 based on how often the individual felt this way, with higher scores indicating greater frequency. Total summary scores range from 0 to 60, with the cut-off for clinical levels of depressive symptomatology being 16 or higher [22]. The CES-D has had moderate criterion validity among low income, minority women and has been related to a depression diagnosis based on diagnostic interviews [24]. In a study on women with prenatal depression internal consistency (Cronbach alpha) ranged from 0.88 to 0.93 [25] as well as a significant test-retest reliability and convergent validity with other depression symptom scales.

**Edinburgh Postnatal Depression Scale (EPDS):** The EPDS is a 10-item questionnaire that asks subjects to report the severity of symptoms experienced in the last 7 days [26]. Each item on the EPDS has a range of 0-3. The EPDS has been well validated in both postpartum and prepartum populations [26,27]. The scale has high predictive validity, high sensitivity, and low false positive rates. An added benefit is that it covers the main symptoms of depression but excludes somatic symptoms such as fatigue and change in appetite, which could be present in normal pregnancy [26-28].

**Profile of Mood States (POMS):** The POMS Depression Scale consists of 12 items on depression. They are rated on 5-point scales ranging from (0) not at all to (4) extremely. The scale has adequate concurrent validity and good internal consistency (r=0.95) [29].

**State Anxiety Inventory (STAI):** This scale was included because depression and anxiety are often comorbid. The State Anxiety Inventory is comprised of 20 items and is summarized by a score ranging from 20 to 90 assessing how anxious the individual feels in terms of severity (“not at all” to “very much so”). Characteristic items include “I feel nervous” and “I feel calm”. Research has demonstrated that the State Anxiety Inventory has adequate concurrent validity and internal consistency (r=0.83) [30].

**State Anger Inventory (STAXI):** [31] is a 10-item inventory that assesses general feelings of anger based on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). Typical questions include “I am quick tempered” and “I fly off the handle”. Psychometric properties have been established for the STAXI on diverse ethnic groups including a reliability coefficient of 0.97.

**The Relationship Questionnaire:** [14] is comprised of 12 items on a 4-point Likert scale. The questionnaire was designed to be behaviorally focused on positive and negative aspects of the relationship. The positive dimensions include a sense of support and care, as well as satisfaction, closeness and joint interests and activities,

and the negative dimensions include anxiety, irritability and criticisms that have been associated with undesirable outcomes.

Cortisol, estriol, and progesterone levels were assayed from saliva samples. These assays were performed by Salimetrics.

## Results

The groups did not differ on demographic variables (Table 1) and baseline measures. Repeated measures by group ANOVAs were conducted with the repeated measures being pre to post session changes on the first and last days of the study. As can be seen in table 2, repeated measures by group interaction effects suggested that the yoga group experienced several pre to post session changes in contrast to the support group who did not show any significant changes as follows: 1) decreased depression on the first and last days; 2) decreased anxiety on the first and last days; 3) decreased anger on the first day; 4) decreased back pain on the first and last days; and 5) decreased leg pain on the first day.

As can be seen in table 3, repeated measures effects suggested that both groups showed significant changes over the course of the

Variable	Group							
	Yoga				Support			
	1 <sup>st</sup> day		Last day		1 <sup>st</sup> day		Last day	
Depression	26.7	19.5 <sup>2</sup>	18.6	15.9 <sup>1</sup>	27.3	25.5	22.1	21.2
(POMS)	(13.9)	(16.9)	(13.5)	(15.7)	(14.0)	(16.6)	(16.5)	(16.7)
Anxiety	55.0	46.6 <sup>4</sup>	48.3	45.5 <sup>1</sup>	53.4	51.0	47.4	46.1
(STAI)	(8.8)	(8.7)	(8.1)	(8.2)	(7.8)	(8.7)	(8.4)	(8.5)
Anger	25.0	23.7 <sup>3</sup>	20.9	20.7	22.4	21.3	20.7	21.0
(STAXI)	(7.6)	(7.5)	(8.1)	(8.5)	(7.3)	(7.5)	(7.0)	(7.6)
Back Pain	4.4	3.3 <sup>1</sup>	4.4	3.5 <sup>1</sup>	4.3	3.9	4.4	3.9
	(2.8)	(2.8)	(3.0)	(2.9)	(2.6)	(2.7)	(3.8)	(2.9)
Leg Pain	3.0	2.4 <sup>1</sup>	3.8	3.5	3.3	2.9	3.2	3.3
	(2.7)	(2.7)	(3.3)	(3.4)	(3.0)	(2.7)	(2.6)	(2.4)

\*Superscripts in column 2 = pre-post session differences on 1st day for yoga group and in column 4 for pre-post session differences on last day of treatment period (Superscripts 1p= .05 2p= .01 3p= .005 4p= .001)

**Table 2:** Mean scores (and standard deviations in parentheses) for short-term effects. (pre vs. post session on 1<sup>st</sup> and last days) of yoga versus support group anticipation

Variable	Group			
	Yoga		Support	
	1 <sup>st</sup> day	Last day	1 <sup>st</sup> day	Last day
Depression (CES-D)	33.0 (10.2)	23.8 <sup>2</sup> (9.3)	35.1 (9.8)	25.2 <sup>4</sup> (10.4)
• Depressed	9.9 (3.6)	6.4 <sup>4</sup> (3.5)	10.1 (13.3)	6.7 <sup>4</sup> (3.4)
• Somatic/vegetative	10.7 (3.7)	7.5 <sup>4</sup> (3.5)	11.3 (3.7)	8.4 <sup>4</sup> (3.7)
• Positive affect	5.1 (2.5)	4.9 <sup>2</sup> (2.6)	6.3 (2.7)	4.7 <sup>2</sup> (2.7)
• Interpersonal distress	2.6 (1.9)	1.9 <sup>4</sup> (1.8)	2.7 (2.0)	2.0 <sup>3</sup> (2.0)
Depression (EPDS)	12.5 (5.0)	8.5 <sup>3</sup> (5.3)	16.4 (4.5)	11.5 <sup>3</sup> (6.5)
Depression (POMS)	26.7 (13.9)	18.8 <sup>4</sup> (13.2)	27.3 (14.0)	22.1 <sup>4</sup> (16.5)
Anxiety (STAI)	55.0 (8.8)	48.3 <sup>4</sup> (8.1)	53.4 (7.8)	47.4 <sup>4</sup> (8.4)
Anger (STAXI)	25.0 (7.5)	20.9 <sup>4</sup> (8.0)	22.4 (7.3)	20.7 <sup>4</sup> (7.0)
Relationship Quality	0.4 (0.9)	0.6 <sup>1</sup> (0.7)	0.2 (0.9)	0.5 <sup>1</sup> (0.7)

\*Superscripts in column 2=1<sup>st</sup> day – last day differences for yoga group and in column 4 for 1<sup>st</sup> day – last day differences for support group (Superscripts 1p=0.05, 2p=0.01, 3p=0.005, 4p=0.001)

**Table 3:** Mean scores (and standard deviations in parentheses) for long-term (1<sup>st</sup> vs. last day) effects of yoga versus support group participation.



Variable	Group							
	Yoga				Support			
	1st day		Last day		1st day		Last day	
Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Cortisol	0.35 (0.23)	0.27 <sup>4</sup> (0.27)	0.47 <sup>4</sup> (0.20)	0.32 <sup>4</sup> (0.10)	0.28 (0.17)	0.15 <sup>4</sup> (0.11)	0.41 <sup>4</sup> (0.25)	0.29 <sup>4</sup> (0.17)
Estriol	575.9 (445.8)	479.9 (359.0)	1455.3 <sup>4</sup> (878.2)	1260.4 <sup>1</sup> (679.7)	407.7 (467.0)	405.0 (385.9)	1331.4 <sup>4</sup> (815.5)	1226.2 <sup>1</sup> (780.5)
Progesterone	718.1 (350.0)	652.6 (332.8)	1310.0 <sup>4</sup> (663.2)	1084.1 <sup>2</sup> (542.1)	490.4 (325.7)	494.3 (393.9)	1081.8 <sup>4</sup> (780.8)	843.3 <sup>2</sup> (508.4)

\*Superscripts in column 2=pre-post differences on 1<sup>st</sup> day for yoga group, in column 3=differences first and last day for yoga group, in column 4= pre-post differences on last day, in column 6= pre-post differences on 1st day for support group, in column 7 differences first and last day for support group and in column 8= pre-post differences on last day for support group (Superscripts <sup>1</sup>p=0.05, <sup>2</sup>p= 0.01, <sup>3</sup>p=0.005, <sup>4</sup>p=0.001)

**Table 4:** Mean scores (and standard deviations in parentheses) for short-term (pre-post session) and long-term (1<sup>st</sup> day vs. last day) hormonal effects of yoga versus support group participation.

Variable	Group			
	Yoga		Support	
	1 <sup>st</sup> day	Follow-up day	1 <sup>st</sup> day	Follow-up day
Depression (CES-D)	33.8 (11.2)	24.3 <sup>2</sup> (14.0)	33.8 (10.0)	24.5 <sup>3</sup> (10.3)
• Depressed	10.2 (9.6)	6.6 <sup>3</sup> (4.8)	9.6 (3.5)	6.5 <sup>3</sup> (4.1)
• Somatic/vegetative	10.5 (3.7)	8.0 <sup>3</sup> (4.1)	10.7 (3.6)	8.3 <sup>3</sup> (3.6)
• Positive affect	5.5 (2.1)	4.3 <sup>3</sup> (2.4)	6.5 (2.8)	4.4 <sup>3</sup> (2.3)
• Interpersonal distress	2.4 (1.8)	2.2 <sup>1</sup> (2.3)	2.6 (2.0)	1.9 <sup>1</sup> (2.1)
Depression (POMS)	26.8 (14.2)	18.8 <sup>2</sup> (14.5)	25.3 (13.0)	17.5 <sup>2</sup> (15.9)
Anxiety (STAI)	55.8 (9.6)	47.3 <sup>3</sup> (12.7)	52.8 (6.9)	47.2 <sup>3</sup> (7.4)

(Superscripts <sup>1</sup>p=0.05, <sup>2</sup>p=0.005, <sup>3</sup>p=0.001)

**Table 5:** Mean scores (and standard deviations in parentheses) for first day vs. follow-up day (postpartum) effects of yoga vs. support groups.

treatment period and no group differences were noted as follows: 1) decreased depression on all measures of depression including the CES-D and its subscales (depressed affect, somatic/vegetative signs, positive affect and interpersonal distress) the EPDS and the POMS; 2) decreased anxiety on the STAI; 3) decreased anger on the STAXI; and 4) improved relationship quality.

Repeated measures by group ANOVAs were also performed on the biochemical measures, with the repeated measures being pre to post session changes on the first and last days. As can be seen in table 4, the following effects occurred: 1) for cortisol reductions, both groups showed reduced cortisol from pre to post session on the first and last days. However, as would be expected across pregnancy, both groups showed increased cortisol from the first to the last day of the study; 2) estriol decreased from pre to post session for both groups on the last day although the levels increased for both groups from the first to the last day; and 3) Similarly, progesterone levels decreased for both groups from pre to post session on the last day, but the levels increased for both groups from the first to the last day.

Finally, repeated measures by group ANOVAs were conducted on the depression and anxiety measures from the first day and the postpartum visit. As can be seen in table 5, both groups showed: 1) decreased CES-D depression summary and subscale scores; 2) decreased POMS depression scores; and 3) decreased STAI anxiety scores from the first day to the follow-up postpartum assessments.

## Discussion

These data suggest that yoga may be an effective intervention for prenatally depressed women. Increased vagal activity following yoga may account for these effects. When pregnant women were randomly assigned to yoga, deep relaxation or standard prenatal exercise groups, stress decreased by 32% in the yoga group and increased by 7% in the control group [32]. Heart rate variability or vagal activity increased in the yoga group from baseline by 64% in the 20<sup>th</sup> week gestation and by 150% in the 36<sup>th</sup> week, suggesting increased relaxation. The low-frequency band of heart rate (a measure of stress) was also decreased after deep relaxation at the 36<sup>th</sup> week in the yoga group. Since this was a home-based program that relied on diaries and verbal reports of the participants, the compliance data are tenuous. However, that vagal activity increased suggests that pregnancy-related stress may be significantly reduced by yoga, which in turn, would likely lead to lower cortisol levels and a lower incidence of preterm delivery. Although cortisol levels decreased following the yoga sessions, they did not decrease across pregnancy in that study.

The immediate decrease in cortisol from pre to post sessions in the current study is consistent with previous data suggesting that yoga leads to decreased cortisol [21]. This may happen via the increase in vagal activity, as increased vagal activity has been associated with decreased cortisol [21]. The relationships between cortisol, progesterone, and estriol are unclear as the data are mixed on those. These data combined suggest that yoga and support groups may be cost-effective therapies for reducing depression, anxiety, anger and cortisol levels as well as improving relationship quality.

Although there were immediate effects of the yoga sessions on depression and cortisol levels and longer term effects for both the yoga and social support groups, the study has limitations. Although the SCID was administered at the start of the study, it was not given again at the end of the study. The use of a standardized interviewer-administered scale such as the Hamilton Rating Scale for Depression or the Inventory of Depression Symptomatology might have been a better measure of depression severity outcome in this treatment study. In addition, this study is not readily comparable to other yoga research studies because the yoga sessions were shorter than those used in studies that have already documented the positive effects of yoga on depression [15]. The shorter sessions of this study were expected to lead to more compliance both with respect to attendance and to continuing yoga practice at home on a daily basis as the women watched the DVD demonstration of the yoga routine. Further research is needed to correct these problems and to determine whether these effects, in turn, lead to lower rates of prematurity and low birth weight.

## Acknowledgements

We would like to thank the women who participated in our studies. This research was supported by an NIH grant (HD056036) and a Senior Research Scientist Award (AT001585) to Tiffany Field and funding from Johnson & Johnson Pediatric Institute to the Touch Research Institute. Correspondence and requests for reprints should be sent to Tiffany Field, Ph.D., Touch Research Institute, University of Miami School of Medicine, and PO Box 016820, Miami, Florida, 33101, Tel: (305) 243-6781; E-mail: mailto:tfield@med.miami.edu

## References

- Field T, Diego M, Hernandez-Reif M, Deeds O, Holder V, et al. (2009) Depressed Pregnant Black Women Have a Greater Incidence of Prematurity and Low Birthweight Outcomes. *Infant Behav Dev* 32: 10-16.
- Gavin AR, Melville JL, Rue T, Guo Y, Dina KT (2011) Racial differences in the prevalence of antenatal depression. *Gen Hosp Psychiatry* 33: 87-93.
- Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, et al. (2010) Risk factors

- for depressive symptoms during pregnancy: A systematic review. *Am J Obstet Gynecol* 202: 5-14.
4. Field T, Diego M, Hernandez-Reif M, Deeds O, Holder V, et al. (2009) Depressed Pregnant Black Women Have a Greater Incidence of Prematurity and Low Birthweight Outcomes. *Infant Behav Dev* 32: 10-16.
  5. Deave T, Heron J, Evans J, Emond A (2008) The impact of maternal depression in pregnancy on early child development. *BJOG* 115: 1043-1051.
  6. de Bruijn AT, van Bakel HJ, van Baar AL (2009) Sex differences in the relation between prenatal maternal emotional complaints and child outcome. *Early Hum Dev* 85: 319-324.
  7. Hay DF, Pawlby S, Waters CS, Perra O, Sharp D (2010) Mothers' antenatal depression and their children's antisocial outcomes. *Child Dev* 81: 149-165.
  8. Einarson A, Choi J, Einarson TR, Koren G (2010) Adverse effects of antidepressant use in pregnancy: An evaluation of fetal growth and preterm birth. *Depress Anxiety* 27: 35-38.
  9. Field T (2010) Prenatal Depression and Selective Serotonin Reuptake Inhibitors. *Int J Neurosci* 120: 163-167.
  10. Butler AC, Chapman JE, Forman EM, Beck AT (2006) The empirical status of cognitive-behavioral therapy: A review of meta-analyses. *Clin Psychol Rev* 26: 17-31.
  11. Parker GB, Crawford J, Hadzi-Pavlovic D (2008) Quantified superiority of cognitive behavior therapy to antidepressant drugs: A challenge to an earlier meta-analysis. *Acta Psychiatr Scand* 118: 91-97.
  12. Spinelli MG, Endicott J (2003) Controlled clinical trial of interpersonal psychotherapy versus parenting education program for depressed pregnant women. *Am J Psychiatry* 160: 555-562.
  13. Field T, Diego MA, Hernandez-Reif M, Schanberg S, Kuhn C (2004) Massage therapy effects on depressed pregnant women. *J Psychosom Obstet Gynaecol* 25: 115-122.
  14. Figueiredo B, Field T, Hernandez-Reif M, Diego M (2007) The relationship questionnaire.
  15. Uebelacker LA, Epstein-Lubow G, Gaudiano BA, Tremont G, Battle CL, et al. (2010) Hatha yoga for depression: critical review of the evidence for efficacy, plausible mechanisms for action, and directions for future research. *J Psychiatr Pract* 16: 22-33.
  16. Javnbakht M, Hejazi Kenari R, Ghasemi M (2009) Effects of yoga on depression and anxiety of women. *Complement Ther Clin Pract* 15: 102-104.
  17. Beddoe AE, Paul Yang CP, Kennedy HP, Weiss SJ, Lee KA (2009) The effects of mindfulness based yoga during pregnancy on maternal psychological and physical distress. *J Obstet Gynecol Neonatal Nurs* 38: 310-319.
  18. Sun YC, Hung YC, Chang Y, Kuo SC (2010) Effects of a prenatal yoga programme on the discomforts of pregnancy and maternal childbirth self-efficacy in Taiwan. *Midwifery* 26: e31-36.
  19. Chuntharapat S, Petpichetchian W, Hatthakit U (2008) Yoga during pregnancy: Effects on maternal comfort, labor pain and birth outcomes. *Complement Ther Clin Pract* 14: 105-115.
  20. Narendran S, Nagarathna R, Gunasheela S, Nagendra HR (2005) Efficacy of yoga in pregnant women with abnormal Doppler study of umbilical and uterine arteries. *J Indian Med Assoc* 103: 12-14, 16-17.
  21. Field T, Diego M, Hernandez-Reif M, Medina L, Delgado J, et al. (2012) Yoga and massage therapy reduce prenatal depression and prematurity. *J Bodyw Mov Ther* 16: 204-209.
  22. Radloff L (1977) The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Methods* 1: 385-401.
  23. Radloff L, Terri L (1986) Use of the Center for Epidemiological Studies-Depression Scale with older adults. *Clinical Gerontologist* 5: 119-135.
  24. Thomas JL, Jones GN, Scarinci IC, Mehan DJ, Brantley PJ (2001) The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. *Int J Psychiatry Med* 31: 25-40.
  25. Maloni JA, Park S, Anthony MK, Musil CM (2005) Measurement of antepartum depressive symptoms during high-risk pregnancy. *Res Nurs Health* 28: 16-26.
  26. Cox JL, Holden JM, Sagovsky R (1987) Detection of postnatal depression-development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 150: 782-786.
  27. Murray D, Cox JL (1990) Screening for depression during pregnancy with the Edinburgh depression scale (EDDS). *J Reprod Infant Psychol* 8: 99-107.
  28. Thompson WM, Harris B, Lazarus J, Richards C (1998) A comparison of the performance of rating scales used in the diagnosis of postnatal depression. *Acta Psychiatr Scand* 98: 224-227.
  29. McNair DM, Lorr M (1964) An analysis of mood in neurotics. *J Abnorm Psychol* 69: 620-627.
  30. Spielberger CD, Gorusch TC, Lushene RE (1970) *The State Trait Anxiety Inventory (STAXI)*. Consulting Psychologists Press, Palo Alto, CA.
  31. Spielberger CD, Ritterband LM, Sydeman SJ, Reheiser EC, Unger KK (1995) Assessment of emotional states and personality trait: measuring psychological/vital signs. In: *Clinical Personality Assessment: Practical Approaches*. Oxford University Press, New York 38-52.
  32. Satyapriya M, Nagendra HR, Nagarathna R, Padmalatha V (2009) Effect of integrated yoga on stress and heart rate variability in pregnant women. *Int J Gynaecol Obstet* 104: 218-22.