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Yoga as a treatment for reducing maternal stress and negative birth outcomes

Sarah Stillman

Barnard College

Specific Aims

In America today, over 15 million people practice yoga. In recent years the practice has been specialized and adapted for the pregnant body. From this, a body of research developed. Past research has focused on basic concepts of yoga, and found significant benefits for the mother. However, fewer studies have done follow-ups to look at birth outcomes and long-term treatment effects of practicing yoga. This study will investigate how to reduce maternal stress and pain, as well as negative birth outcomes in a high-risk population of mothers, by answering the question what kinds of yoga and at what point during pregnancy yoga is useful? This study will specifically target pregnant women whose fetus has been diagnosed with a congenital heart defect. The diagnosis is given around 14 weeks, and with it mothers experience an extraordinary amount of stress. Stress has been shown to increase the risk of premature delivery and low birth weight, which can have long-term effects on the neonate (Narendran, Nagarathna, Narendran, Gunasheela & Nagendra, 2005). Participants will take the Perceived Stress Scale and Brief Pain Inventory when entering the study. They will be randomly assigned to one of five conditions: Vinyasa yoga starting at time of diagnosis, Vinyasa yoga starting at the beginning of third trimester, hatha yoga starting at time of diagnosis, hatha yoga starting at the beginning of third trimester or receiving literature on stress reduction without yoga. Participants will be instructed to use one of two local yoga studios three times a week. Every 3-4 weeks, mothers will go to their OB-GYN for routine blood pressure check, blood draw, saliva test for cortisol and ultrasound. At time of delivery, results of birth outcomes and a final evaluation on maternal stress will be taken. The results will indicate whether one type of yoga has benefits that the other does not, such as one might reduce pain or stress more than another. Another predicted result is that there will be a significant benefit to practicing any kind of yoga compared to standard

obstetric procedures, and yoga practiced throughout pregnancy will decrease negative birth outcomes and maternal stress more than practicing yoga only in the third trimester. This will suggest that yoga is a comprehensive, holistic and long-term approach for reducing stress, pain and negative birth outcomes in high-risk pregnancies. If the hypothesis holds true, yoga during pregnancy might become a widely used treatment, which will be advantageous, not just high-risk mother, but all pregnant women. Ultimately, the implications of this research will provide a useful tool for revising standard obstetric recommendations, which are currently limited.

Background and Significance

The objective of this literature review was to examine the findings of past research on yoga as a treatment to reduce negative birth outcomes during pregnancy. Little is known about the effects that different kinds of yoga have during pregnancy. It has the potential to play a protective role in mental and physical health. A thorough search located a limited number of studies on yoga during pregnancies; of the studies found about yoga during pregnancy, the majority focused on mindfulness-based stress reduction treatments. Due to the limited research on yoga, other literature, served as a point of reference when comparing yoga, as a practice, because both are based in a mindfulness approach to postures and breathing techniques. The lack of research on yoga not only speaks to the need for further research in this area, but also severely limits the ability to summarize conclusive evidence.

Beddoe, Yang, Kennedy, Weiss & Lee (2009) investigated the perceived changes in stress, anxiety and pain using a one-group pre-post intervention design. The intervention was a seven-week mindfulness based yoga program that used a mixture of Iyengar yoga postures and methodology of mindfulness-based stress reduction by Kabot-Zinn. 16 women, in their second and third trimester (12-32 weeks), participated. The study used four self-report scale measures to

look at perceived stress, pregnancy stress, trait anxiety and state anxiety pre- and post-intervention. This was the first study to look at these four dimensions. Findings indicated a significant decrease in perceived general stress and anxiety post-intervention. There was only a trend toward decreased stress and anxiety as it related to pregnancy. There was no significant decrease in pain amongst either the second or third trimester group. However the second trimester group's pain intensity did not increase, and they spent significantly less time in pain and had less impairment due to pain. These findings suggested that the yoga intervention helped develop early postural habits that were protective for pain. The study's two main limitations were the small sample size and lack of a control group. Also the long-term effects of the treatment were unknown. The current study hopes to expand and study the long-term effects of such a treatment. By correcting a few of the limitations, specifically increasing the number of participants, length and frequency of participation, and including a control group, there will be substantial validity to the findings.

Narendran, Nagarathna, Narendran, Gunasheela & Nagendra (2005) completed the first study investigating the impact of yoga on pregnancy outcomes. Conducted in India, 335 women, enrolled 18-20 weeks into their pregnancy, to participate in a matched-control design study. Participants in the yoga group practiced a set of posture, breathing and meditation for one hour every day from the time of enrollment to the time of delivery. None of the participants were at risk for poor pregnancy outcomes. The findings indicated, amongst the intervention group, there was a significant decrease in preterm deliveries and decreased number of low birth weight newborns. There was also a trend toward significance for a decrease in cesarean deliveries. The study demonstrated that yoga provided a potential treatment for improving pregnancy outcomes specifically for low birth weight and prematurity. One limitation of this study was that the

control group was not randomized. Instead, women who did not live near the treatment facility were unable to participate in the yoga option. The current study hopes to replicate the findings on the decrease of negative birth outcomes, however a larger effect is expected because of the nature of a high-risk group.

Vieten & Astin (2007) designed and implemented an eight-week mindfulness intervention program to help reduce stress and negative mood during pregnancy. In a randomized control study of 31 women in their second and third trimester, who reported difficulty with mood and anxiety and had previous history of treatment for mood or anxiety disorder, participated in this study. The experimental group completed an intervention that incorporated mindfulness techniques including body scans, breath and thought awareness, and meditation based on Hatha yoga principles. All women also received weekly readings. Pre and post intervention self-report scores of perceived anxiety and depressed mood were recorded. There were three main findings. There was a significant decline in anxiety and negative affect amongst the experimental group compared to the control group. There was a trend toward significance of decrease in depression and an increase in positive affect. However due to the small sample size this did not allow for statistical power. At a three-month follow-up there was not a significant difference between the experimental and control group, nevertheless the experimental group did retain 7-10% of their improvements. A few limitations of this study include the small sample size, unrepresentative sample, reliance on self-report measures and inactive control group. Another drawback of this study was that the effects of the program clearly decreased, and were not carried out to term to see if there was a decrease in negative pregnancy outcomes. The current study hopes to correct some of these limitations by including a larger sample size, use both self-report and clinician reports, and use an active control group.

Bastani, Hidarnia, Kazemnejad, Vafaei & Kashanian (2005) assessed the effects of applied relaxation techniques during pregnancy to reduce stress and anxiety. In a randomized controlled study, 110 women in their second trimester demonstrated moderate stress and anxiety measured by three self-report inventory scales. The women participated in a seven-week, once per week, training session. Both the experimental and control group were given educational literature on reducing stress. At the end of the trial, all participants completed to same three stress and anxiety scales, which was used to measure the change post intervention. There were four main findings in the study. After intervention, there was a significant decrease in state and trait anxiety on all three scales in the experimental group compared to the control group. The experimental group also had a significant decrease in stress post-intervention compared to pre-intervention. There were no changes in pre and post-test scores of state or trait anxiety in the control group. There was a significant increase in stress in the control group post-intervention. These findings demonstrate that relaxation techniques are effective for decreasing anxiety and stress. However the study's findings are limited because the long-term effects are unknown. Another limitation of the findings was the self-report data. The present study hopes to expand on these findings of relaxation technique by following up with women to term.

Urech, Fink, Hoesli, Wilhelm, Bitzer, & Alder (2010) investigated the effects of relaxation on the psychobiological wellbeing of 39 women in their third trimester. This was the first study to complete a randomized controlled trial of two different active relaxation techniques, progressive muscle relaxation (PMG) and guided imagery (GI), compared to passive relaxation, and its effects on anxiety, cardiovascular and endocrine functioning. During a two-hour visit, saliva samples, blood samples, heart rate, and blood pressure were taken at four separate times: pre-intervention, immediately post-intervention, 10 minutes – post-intervention and 20 minutes

post-intervention. The results indicated that active relaxation significantly benefited a women's psychological and cardiovascular state. The experimental group who engaged in GI exercise, as opposed to PMR, experienced significantly increased relaxation than passive relaxation control. Researchers explained that the finding might be due to the fact that GI is a more comfortable relaxation exercise, which probably increased its agreeableness with participants. Other findings suggested a decrease in stress due to a decline in adrenocorticotrophic hormone (ACTH) and salivary cortisol in the PMR group. The GI group had four times less salivary cortisol than passive relaxation group. In summary, the study illustrated how two different active relaxation techniques can positively affected psychological and biological stress symptoms as opposed to passive relaxation. The present study hopes to extend the finding of two different active relaxation techniques to two different yoga techniques, Hatha and Vinyasa yoga, which similarly have an engaged muscle component and another that is more comfortable. The current study hopes to correct a few of the limitations from this study, getting a more representative sample.

The current study aims to combine many facets of past research to answer the larger question of what kinds of yoga during pregnancy are a useful treatment for lowering maternal stress and reducing negative birth outcomes and what point beginning the intervention is the most effective. It is predicted that yoga will be an effective treatment for reducing negative birth outcomes and maternal stress.

Research Design and Methods

Rational

The proposed study would to take a prospective approach to a randomized control trial to evaluate two forms of yoga practiced starting during the second and third trimester or starting during the third trimester. The timeframe of the study is variable, since not all participants will

be admitted at once. Also, the two different kinds of yoga, Vinyasa and Hatha provide a dichotomy of active body movements compared to slow postural changes. It is important to investigate timing of when a participant started the yoga practice routine and compare it to the levels of reduced pain, stress and negative birth outcomes. In doing the analyses through SPSS database, the findings will provide a clearer picture of what symptoms can be alleviated most effectively by which type and what duration of yoga practice. These results will indicate the potential benefits of each type of intervention, as well as which type of patients might receive the most help from the treatment. Practicing yoga, though an individual exercise, is done with others. Women in the group yoga session not only will learn important techniques to help reduce stress but also gain a social support network for pregnant mothers. This study takes a holistic approach to care of the mother by providing physical and emotional support.

Participants

The study population hopes to recruit 300 pregnant women, 60 women per condition, whose fetus has been given the diagnosis of congenital defect. Recruitment will use approved flyers and mailing to community doctor's offices, hospitals and yoga studios. The women will be all from the same city, or within a 15 minutes drive of one of the two yoga studios. To facilitate compliance, participants will be offered free yoga classes, money for transportation to and from class, as well as a yoga mat. Eligible women will need to be older than 20 years of age and younger than 40 years, have received a diagnosis of fetal congenial defect, and be at the end of the first trimester or beginning of the second trimester. Other eligibility requirements include healthy weight as indicated by their BMI, no prior history of smoking or drinking alcohol during pregnancy, no pre-pregnancy complaints, be first-time mothers, singleton, planning a hospital birth and no previous diagnosis of depression or anxiety disorders.

*Measures***Stress:**

There will be a pre-intervention baseline assessment, the Perceived Stress Scale (PSS), which has proven to have high reliability in pregnant populations. Psychological stress is defined as the way a person perceived personal demands and their own ability to cope (Vieten et al., 2007). Due to the nature of the scale it can be individualized for the participants but the scale offers an objective measure for analysis. High scores on PSS have been correlated with low birth weight (Vieten et. al., 2007). This measure will be repeated every four weeks to track progress and finally three-days post-delivery.

Pain:

There will be pre-invention baseline assessments of pain using modified versions of the Brief Pain Inventory (BPI) with two dimensions: pain intensity and pain interference with daily activities. As described by Beddoe et. al (2009), there is good internal validity though location of pain is not monitored.

Birth Outcomes:

In combination with the self-report scales, physical records of blood pressure and ultrasounds will create a balance to offset any self-serving bias. Every 3-4 weeks the pregnant mother will go to her routine OB-GYN for result of heart, rate blood pressure and blood draw which will indicate importance psychobiological indicators of stress (Urech et. al., 2010).

Intervention

A treatment plan based on yogic principles will be developed to train pregnant women a series of physical postures, breathing techniques and meditations practices. Depending on the group, Hatha and Vinyasa will have a different set of postures and breathing techniques unique

to this yoga practice. However, each type of yoga will have the three core elements, of physical postures in standing, sitting and lying position that strengthening and balance the body; breathing techniques including prolonged exhalation, breath retention and exhalation; and meditation principles of increasing self awareness, body scans and mantras. A trained specialist in prenatal yoga will lead each yoga session. One yoga studio will offer only Hatha classes while the other will offer only Vinyasa classes. The set of postures will be altered and adapted for the trimester.

Procedure

For all participants:

Participants will sign the consent form. Upon completion of the PSS and BPI, participants will be placed in one of five condition groups. At time of delivery, the mode of delivery, birth weight, duration of labor, and length of gestation will be documented. 48–72 hours post-birth, the mother will complete the PSS and BPI for a final time. All data will be analyzed using ANOVA. Control groups, whole term and third trimester control will be analyzed to see if the duration of yoga practices has an effect and to see if there is a significant stress reduction between groups. The type of yoga will also be cross referenced to see if one type of yoga has a greater effect at reducing maternal stress or reducing the number of negative birth outcomes.

Control:

The control group will be instructed to follow the standard obstetric guidelines of walking twice a day for 30 minutes and will be provided supplemental brochures about how to reduce stress. Every three to four weeks, during their routine prenatal visit at a hospital or OB-GYN, subjects will have an ultrasound, blood pressure, heart rate, saliva sample and blood draw. Separately, researchers at this time will have the subjects retake PSS and BPI.

Full term yoga conditions:

For participants in full term yoga conditions, they will begin yoga class three times a week starting as soon as possible, ending at time of delivery. Participants will also receive supplemental reading about reducing stress and will be encouraged to practice the techniques they learned in class throughout the week. Every three to four weeks, during their routine prenatal visit at a hospital or OB-GYN, subjects will have an ultrasound, blood pressure, heart rate, saliva sample and blood draw. Separately, researchers at this time will have the subjects retake PSS and BPI.

Third trimester yoga condition:

For the participants in the third trimester condition, PSS and BPI will be taken right after finding out about the diagnosis. They will be offered supplemental readings about reducing stress through their pregnancy. Starting at the beginning of the third trimester, participants will begin yoga classes three times a week until delivery. Every three to four weeks, from time of diagnosis, during their routine prenatal visit at a hospital or OB-GYN, subjects will have an ultrasound, blood pressure, heart rate, saliva sample and blood draw. Separately, researchers at this time will have the subjects retake PSS and BPI.

Predicted Results

Three main findings are expected. The predicted result will demonstrate that yoga, as opposed to standard obstetric procedures, can significantly lower maternal stress, pain and negative birth outcomes in a high-risk population. There is no expected difference between types of yoga and its effects on maternal stress. However, within the subtypes of yoga, Vinyasa, as opposed to Hatha, will significantly reduce maternal pain. Full term treatment will

be significantly decrease negative birth outcomes, maternal stress and pain compared to third term group.

Yoga practiced full term, as opposed to only in the third trimester, will significantly reduce stress and will decrease negative birth outcomes. In all five studies reviewed, participants who practiced yoga significantly increased the mean gestation age and birth weight of fetus and also experience lower maternal stress. However, in all the studies reviewed participants mainly practiced yoga from mid-gestation to delivery or for a set period of weeks. No study looked at duration of yoga practice in comparison to decreased negative birth outcomes and maternal stress. If there is a relationship between yoga and reduced negative birth outcomes, it could be extrapolated that increasing the duration of the practice to full-term will create a larger effect size.

It is suggested that Vinyasa yoga will differ significantly decreased maternal pain compared to hatha yoga. The benefits practicing Vinyasa yoga, as opposed to hatha yoga, go beyond the basic postures and focus on breath to strengthening the body through the flow of many postures. By building abdominal and back muscles this will help mother's keep good posture and will strengthen their body, so that they can more healthily adapts to the extra weight.

There are a few limitations to this design. First, is subject burden since asking participants to partake in a class three times a week can be time and energy consuming. Hopefully, due to nature of the free classes and ease of location this will not be too much of a concern. The large subject pool should if necessary play a crucial piece if a participants decides to no longer take part in the study. Another limitation to this study is the duration of the study. Since pregnancy has a long duration and subjects will enter the study at different points in time,

there will need to be a strong working relationship between doctors, yoga studios and researchers. Lastly, PSS and BPI are self-report measure, which can create a bias especially because individuals have different pain tolerances and therefore might interpret a question differently. To counteract this limitation, the clinician reports during the OB-GYN examines will provide a second and less biased prospective. Lastly, every pregnancy is unique and can experience complication, so when analyzing the data this will be taken into consideration.

The diagnosis of congenital heart defects in fetuses causes severe stress for a pregnant mother. Despite these caveats with the study, the need for research on yoga treatments are imperative to combating negative birth outcomes related to maternal stress. By successfully adding to the literature it will aid obstetrician's recommendations of yoga as an effective treatment to help lower maternal stress, decrease pain and negative birth outcomes. Ultimately yoga interventions during pregnancy will positively impact the trajectory of a mother's pregnancy, post-partum experience and the neonate's life. Yoga is not only a cost-effective treatment; it is noninvasive and can be practice anywhere. Interventions such as this, should go beyond focusing only on yogic principles, and instead be a pure yoga practice consisting of a typical flow of postures, breathing and meditation. In this important next step, yoga as a treatment for reducing maternal stress and negative birth outcomes could be applicable to all high-risk groups or every pregnant mother, making pregnancy a truly joyful time.

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