Acute feTal behavioral Response to prenatal Yoga: a single, blinded, randomized controlled trial (TRY yoga)

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BACKGROUND: In 2012, yoga was practiced by 20 million Americans, of whom 82% were women. A recent literature review on prenatal yoga noted a reduction in some pregnancy complications (ie, preterm birth, lumbar pain, and growth restriction) in those who practiced yoga; to date, there is no evidence on fetal response after yoga.

OBJECTIVES: We aimed to characterize the acute changes in maternal and fetal response to prenatal yoga exercises using common standardized tests to assess the well-being of the maternal-fetal unit.

STUDY DESIGN: We conducted a single, blinded, randomized controlled trial. Uncomplicated pregnancies between 28 0/7 and 36 6/7 weeks with a nonanomalous singleton fetus of women who did not smoke, use narcotics, or have prior experience with yoga were included. A computer-generated simple randomization sequence with a 1:1 allocation ratio was used to randomize participants into the yoga or control group. Women in the yoga group participated in a 1-time, 1 hour yoga class with a certified instructor who taught a predetermined yoga sequence. In the control group, each participant attended a 1-time, 1 hour PowerPoint presentation by an obstetrician on American Congress of Obstetricians and Gynecologists recommendations for exercise, nutrition, and obesity in pregnancy. All participants underwent pre- and postintervention testing, which consisted of umbilical and uterine artery Doppler ultrasound, nonstress testing, a biophysical profile, maternal blood pressure, and maternal heart rate. A board-certified maternal-fetal medicine specialist, at a different tertiary center, interpreted all nonstress tests and biophysical profile data and was blinded to group assignment and pre- or postintervention testing. The primary outcome was a change in umbilical artery Doppler systolic to diastolic ratio. Sample size calculations indicated 19 women per group would be sufficient to detect this difference in Doppler indices (alpha, 0.05; power, 80%). Data were analyzed using a repeated-measures analysis of variance, a χ^2, and a Fisher exact test. A value of $P < .05$ was considered significant.

RESULTS: Of the 52 women randomized, 46 (88%) completed the study. There was no clinically significant change in umbilical artery systolic to diastolic ratio ($P = .34$), pulsatility index ($P = .53$), or resistance index ($P = .66$) between the 2 groups before and after the intervention. Fetal and maternal heart rate, maternal blood pressure, and uterine artery Dopplers remained unchanged over time. When umbilical artery indices were individually compared with gestational age references, there was no difference between those who improved or worsened between the groups.

CONCLUSION: There was no significant change in fetal blood flow acutely after performing yoga for the first time in pregnancy. Yoga can be recommended for low-risk women to begin during pregnancy.

Key words: fetal behavior, fetal response, prenatal yoga, yoga pregnancy

Yoga is a widely recognized form of exercise with purported health benefits. According to a 2012 National Institutes of Health survey, 21 million US adults practice yoga; the majority were reproductive-age women.[1] Yoga is a low-impact, slow-moving, and easily modifiable activity that makes it a suitable exercise for pregnant women.

Well-designed studies continue to emerge since 2008 demonstrating maternal benefits such as a reduction in pregnancy related pain, anxiety, and depression.[2,3] Stress and inflammatory markers can decrease acutely in nonpregnant yoga practitioners and may have the same effect in pregnancy, thereby affecting fetal circulation.[4] However, limited data exist on adverse fetal effects such as a flux in fetal heart rate or blood flow in response to yoga.

The American Congress of Obstetricians and Gynecologists (ACOG) encourages all pregnant women to perform moderate intensity exercise for at least 30 minutes a day on most days to obtain maternal and fetal benefits.[5] Fetal tolerance to walking, swimming, and cycling has been demonstrated.[6-8] Previously sedentary women demonstrated overall reassurance of fetal well-being when beginning these aerobic exercises in pregnancy. A PubMed search noted a paucity of reports to support fetal response to yoga.

The purpose of our randomized controlled trial (RCT) was to characterize the acute maternal and fetal response to prenatal yoga exercise using common standardized tests to assess the well-being[9] of the maternal-fetal unit. The primary objective was to evaluate changes in fetal blood flow via umbilical Doppler studies in response to yoga exercises in new yoga practitioners. We hypothesize that yoga during pregnancy has an effect on acute fetal behavior.

Materials and Methods

This was a single, blinded, randomized controlled trial conducted at a safety net hospital in Kansas City, MO. Institutional review board approval number 13-941 was obtained, and the trial was registered on ClinicalTrials.gov (identifier, NCT02063711) prior to the initiation of the study.

We included women who were at least 18 years of age, English literate, and had a low-risk singleton pregnancy without any contraindications to exercise.[5] Because the accuracy of fetal well-being

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tests, particularly umbilical artery Dopplers, is unclear before 28 weeks,[10] randomization and interventions occurred between 28 0/7 weeks and 36 6/7 weeks' gestation. Women who smoked cigarettes within the last 6 months, abuse illicit substances or narcotics, had any chronic medical condition affecting her pregnancy, or had multiple gestations or known fetal growth restriction were excluded.

Daily screening of medical records was performed to identify eligible participants. Written informed consent was obtained at a prenatal visit. Interventions were conducted in a room located on the same floor as the perinatal ultrasound unit. Each appointment lasted approximately 4 hours. Women were instructed to avoid eating or drinking anything except for water 1 hour prior to arrival.

Upon arrival to the appointment, each participant was randomized to intervention allocation and allowed to sit quietly for 15 minutes to stabilize blood pressure.[6] Subsequently, maternal blood pressure (MBP) and heart rate (MHR) were recorded using a precalibrated automated sphygmomanometer (Welch Allyn Spot Vitals Signs LXi, Skaneanteles Falls, NY) on the left arm. Height and weight were manually obtained by a clinical nurse. A complete biophysical profile (BPP) with nonstress test (NST) was then performed and interpreted according to ACOG criteria.[9]

Umbilical artery (UA) Doppler interrogation was performed on the first free loop near the abdominal cord insertion in the absence of fetal breathing.[11] Bilateral uterine arteries were assessed by color and pulse Doppler velocimetry immediately after crossing the hypogastric artery and before entry into the uterus.[11] All ultrasound exams (Philips IU22 and Philips ClearVue 550, Philips, Andover, MA) were performed by a registered diagnostic medical sonographer, who has been in practice for more than 13 years. Built-in software on the Philips IU22 calculated the umbilical artery systolic to diastolic ratio (S/D), resistance index (RI), and pulsatility index (PI) and uterine artery PI.

Upon completion of preintervention testing, subjects participated in either the 1 hour yoga or the control group. All interventions were one on one with 1 research investigator (S.B.), who is a certified yoga instructor and had specialized training in prenatal yoga. A predetermined sequence consisting of 23 postures, 1 breathing technique executed for 2 minutes, and an 8-10 minute final resting pose were performed based on a review of prior studies on prenatal yoga[2,12] and a collaboration of prenatal yoga instructors. Each pose was held for 3-5 deep breaths (Supplemental Table). All yoga participants were provided a 12 page color pamphlet consisting of information on yoga poses that were performed in class and could safely be performed at home (Appendix).

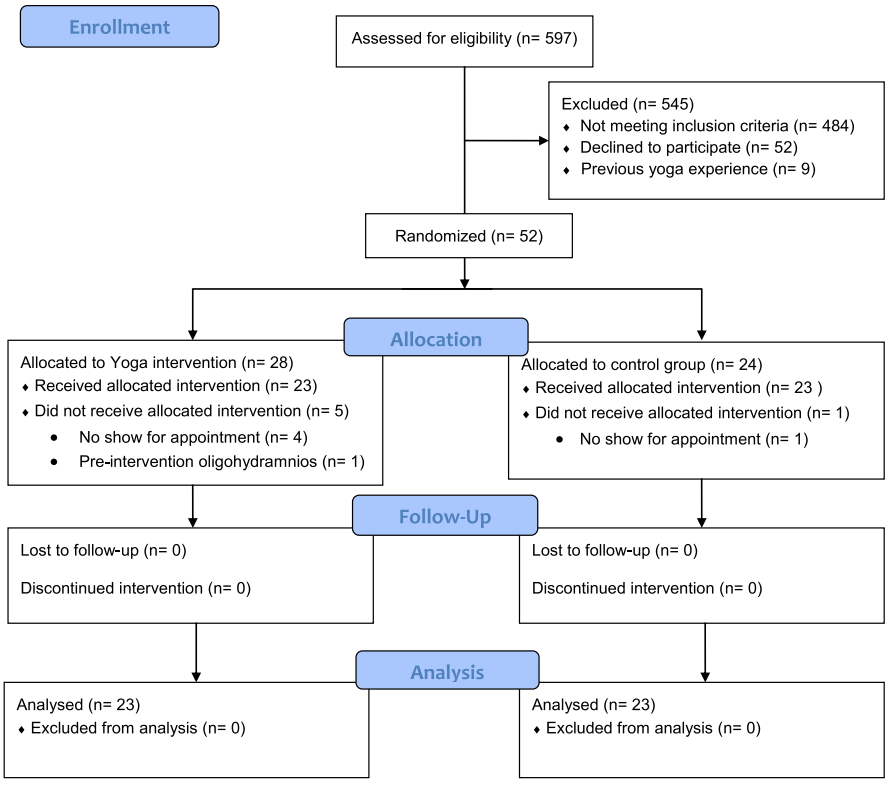
Subjects randomized to the control intervention participated in a PowerPoint presentation derived from and received a copy of the following ACOG pamphlets: exercise during pregnancy, obesity and pregnancy, and nutrition during pregnancy.[13-15] ACOG-recommended exercises that can be performed during and after pregnancy were also reviewed.[16] All participants remained seated and were provided a bottle of water during the intervention.

After the completion of the intervention, MBP and MHR were obtained immediately (within 2 minutes) and after 15 minutes. All women had a BPP with NST and Dopplers in the same fashion as the preintervention testing. Monetary compensation for participation was provided.

Gestational age at delivery, mode of delivery, birthweight, Apgar scores, and umbilical artery pH were obtained from delivery records. Participants were contacted at their 6 week postpartum visit or by telephone to complete a survey on maternal behavior toward exercise during the remainder of pregnancy and after delivery.

Fetal well-being was assessed by common indices such as UA Dopplers, fetal heart rate, and biophysical profiles. Our primary outcome was to detect any

FIGURE
CONSORT flow diagram



Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

clinically and statistically significant changes in UA S/D ratio Doppler results. This variable was chosen because it has been assessed in others exercise studies,[6-8] it is easily reproducible, and is a reliable measure.

Abnormal UA S/D ratio was defined as greater than 95th percentile for gestational age.[17] UA indices were assessed as a continuous variable and compared individually against reference ranges for gestational age. The change from baseline was reported as normal with no change, abnormal with no change, worsened (normal baseline to abnormal), or improved (abnormal baseline to normal). Secondary outcomes included MBP, MHR, uterine contractions, uterine artery Dopplers, fetal heart rate (FHR), and other umbilical artery Doppler indices.

At the time of the conception of this study, no data existed in the literature on estimates of effect size for Doppler changes in those who perform yoga in pregnancy. A sample size was calculated to achieve 80% power at the level of 0.05 significance using meaningful clinical change estimates for our primary outcome. A clinically meaningful difference was defined as the mean ratio of 50th percentile changing to greater than the 95th percentile for gestational age.[18] These estimates indicated that 19 per group would be sufficient. Therefore, we aimed to recruit 50 women, 25 per group, with an attrition rate of 20% to obtain a sample size of 19 women per group.

A computer-generated simple randomization sequence with a 1:1 allocation ratio was utilized. Each opaque envelope was numbered and double sealed with a label and clear packaging tape to prevent inadvertent seal breakage. The random allocation sequence and envelope concealment was conducted by a research assistant independent to the study who had no contact with the study participants. The next sequential packet was chosen on the day of intervention.

At the completion of the study, a maternal-fetal medicine (MFM) specialist (J.B.H.), who practices at a tertiary care center in a different state and was not involved with any data collection or patient care at our hospital, interpreted all the BPPs and NSTs. All images were assigned a randomized 4 digit study number to blind the MFM examiner to treatment assignment and whether images were before or after the intervention. The sonographer was also blinded to which intervention was performed between examinations by prohibiting the discussion of intervention allocation or performance between her and the participants.

To assist future trials in sample size calculations and outcome analysis, we added the collection of delivery information from our electronic medical records. To evaluate the efficacy of a 1-time intervention, we also added the collection of a postpartum survey assessing any changes in behavior toward exercise during the pregnancy and after delivery. These changes were approved by our institutional review board and did not have any impact on our primary outcome.

A statistical analysis was conducted with SPSS version 21.0 (SPSS Inc, Chicago, IL). A 2 factor repeated-measures analysis of variance (ANOVA) was used to obtain *P* values for the main effect of group and time and the interaction effect of time by treatment for all Doppler indices, maternal and fetal heart rate, and blood pressure values. Independent

TABLE 1
Baseline characteristics of study participants

Characteristics	Yoga (n = 23)	Control (n = 23)
Maternal age, y	25.5 ± 4.4	25.4 ± 4.6
Race		
African American	16 (69.6)	9 (39.1)
White	2 (8.7)	8 (34.8)
Hispanic	1 (4.3)	5 (21.7)
Other	4 (17.4)	1 (4.3)
Nulliparous	10 (43.5)	10 (43.5)
Education level		
Less than high school	4 (17.4)	1 (4.3)
High school graduate	7 (30.4)	4 (17.4)
Some college	11 (47.8)	11 (47.8)
College graduate	1 (4.3)	7 (30.4)
Gestational age at intervention, wks	30.9 ± 2.0	31.0 ± 2.2
Body mass index, kg/m^2		
Before pregnancy	26.5 ± 6.1	25.1 ± 6.7
<18.49	2 (8.7)	2 (8.7)
18.5–24.9	7 (30.4)	13 (56.5)
25.0–29.9	8 (34.8)	2 (8.7)
≥30	6 (26.1)	6 (26.1)
At time of intervention	30.8 ± 6.1	29.3 ± 6.3
18.5–24.9	4 (17.4)	3 (13.0)
25.0–29.9	6 (26.1)	12 (52.2)
≥30	13 (56.5)	8 (34.8)
Gestational weight gain at time of intervention	24.7 ± 10.9	24.6 ± 12.0

Data are presented as n (percentage) or mean ± SD.

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

TABLE 2
Fetal heart rate and Doppler indices before and after intervention

Variable	Yoga (n =23)	Control (n =23)	*P* value[a]
Umbilical artery systolic to diastolic ratio			Group: .40 Time: .84 Interaction: .34
Before	2.9 ± 0.7	2.7 ± 0.5	
After	2.8 ± 0.5	2.8 ± 0.4	
Umbilical artery pulsatility index			Group: .42 Time: .34 Interaction: .53
Before	1.1 ± 0.2	1.1 ± 0.2	
After	1.1 ± 0.2	1.1 ± 0.2	
Umbilical artery resistance index			Group: .45 Time: .46 Interaction: .66
Before	0.7 ± 0.1	0.7 ± 0.1	
After	0.7 ± 0.1	0.7 ± 0.1	
Fetal heart rate (beats/min)			Group: .58 Time: .01 Interaction: .09
Before	136.5 ± 7.8	137.8 ± 11.7	
After	134.8 ± 9.0	130.9 ± 9.0	

Data are presented as mean ± SD.

[a] Repeated-measures analysis of variance: main effects are for group (yoga vs control), time (before and after intervention), and group-by-time interaction.

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

t tests were used for demographic and delivery data comparison. The categorical variables were evaluated by a χ^2 or Fisher exact test where applicable. A 2 tailed value of $P < .05$ was considered significant. Per the protocol, the analysis was performed as the data were collected on the day of the intervention.

Study data were collected and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted at the University of Missouri Kansas City.[19] REDCap is a secure, web-based application designed to support data capture for research studies, providing the following: (1) an intuitive interface for validated data entry; (2) audit trails for tracking data manipulation and export procedures; (3) automated export procedures for seamless data downloads to common statistical packages; and (4) procedures for importing data from external sources.[19]

Results

A total of 597 women were assessed for eligibility between March and September 2014. Of these women, 104 were eligible for the study, 52 women were randomized, and 46 (88%) completed the study (Figure). The primary outcome was assessed immediately after the intervention; therefore, no women were lost to follow-up. There were no disruptions of the study period. All the yoga participants successfully performed each yoga pose, and no maternal injury occurred.

Baseline demographics are presented in Table 1. The mean body mass index (BMI) at the time of intervention in the yoga group was 30.8 kg/m^2 (range, 19–46 kg/m^2) and 29.3 (range, 20–50 kg/m^2) in the control group. Prior to the intervention, 35% of the yoga group (n = 8) and 39% of the control group (n = 9) endorsed exercising at least 3 times per week.

All variables met assumptions of normality and homogeneity of variance. There was no clinically significant interaction for groups over time for UA S/D, PI, and RI ratios (Table 2). When the umbilical artery Dopplers were compared individually against the references ranges for gestational age,[18] there was no significant change over time between the groups (Table 3).

A statistically significant reduction in FHRs was seen over time in each group (time main effect, $P = .01$); however, all FHRs remained within normal range (120–160 beats per minute [bpm]), except for 1 control group participant who had a preintervention baseline of 170 bpm and 130 bpm after the intervention.

Overall, 83% of the yoga group and 96% of the control had fetal heart rate tracings that met criteria for reactivity before and after the intervention ($P = .16$). All participants achieved a BPP score of 8 of 8 within 30 minutes prior to intervention. After the intervention, an absence of breathing was detected in 22% of each group. A score 10 of 10 was noted in 74% of the control group and 61% of the yoga group ($P = .35$).

Fetal position did not change significantly in either group. All vertex and breech fetuses remained in the same position; 1 transverse fetus became breech and another became vertex after yoga. After the control intervention, 1 vertex fetus turned breech, whereas all others remained in the same position.

All participants were normotensive before and after the intervention (Table 4). The time main effect was significant for a decrease in MHR immediately and 15 minutes after the intervention ($P < .01$); however, there was no significant group-by-time interaction ($P = .71$ and $P = .27$, respectively).

Bilateral UA Doppler PI did not significantly change in either group, even when compared with the individual gestational age references[18] (right UA PI, $P = 1.00$; left uterine artery PI, $P = .62$). Right UA notching was present and remained so in 1 participant in the yoga group. No patients in the control group had right-sided UA notching. Left UA notching was present in 17% of the yoga

group and 9% of the control group prior to intervention with a 50% reduction in both after the intervention ($P = .55$).

Continuation of painless uterine contractions was noted in 2 yoga participants and 1 of 6 control participants. Moreover, 9% of yoga participants initiated painless contractions after the intervention compared with 22% in the control group ($P = .41$).

There were no significant differences among delivery variables between the 2 groups (Table 5). Delivery occurred vaginally in 65% of the yoga group and 61% of the control, and 98% of participants delivered at term. There was a nonsignificant difference in neonatal birth weight between groups ($P = .08$).

A response rate of 67% was achieved on the postpartum survey. Of the 18 respondents in the yoga group, 67% reported to continue exercising in pregnancy vs 62% in the control group ($P = .77$). Of those who exercised, walking (58% yoga group, 63% control group; $P = .50$) and yoga (58% yoga group, 38% control group; $P = .15$) were most commonly performed. On average, 40% of each group reported exercising 2-3 times/week for 16-30 minute sessions. After delivery, 50% of the yoga group reported to continue exercising compared with 54% in the control group ($P = .83$). Of those who were exercising, 77% of the yoga group walked, whereas the control group equally favored cardiovascular exercise (43%) and walking (43%).

A change in fetal position or a normal BPP becoming equivocal after the intervention can be considered as an unintended effect. The likelihood of spontaneous fetal position changes was equal between both groups and both delivered vaginally, demonstrating a lack of persistent breech position. One participant in the entire study had a BPP of 6/10 at 30 weeks, which appeared to be a temporary effect because she subsequently delivered at 41 weeks with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. All other participants had a normal score of 8 or 10 of 10 after either intervention. Neither of the two should be considered as harmful effects of prenatal yoga.

TABLE 3
Change in umbilical artery Doppler indices from normal to > 95th percentile using Fisher exact test

Doppler	Yoga (n = 23) n (%)	Control (n = 23) n (%)	*P* value
Umbilical artery S/D ratio			NS
Normal baseline, no change	15 (65.2)	20 (87.0)	
Abnormal baseline, no change	3 (13.0)	1 (4.3)	
Improved	2 (8.7)	0	
Worsened	3 (13.0)	2 (8.7)	
Umbilical artery RI			NS
Normal baseline, no change	18 (78.3)	18 (78.3)	
Abnormal baseline, no change	1 (4.3)	3 (13.0)	
Improved	1 (4.3)	1 (4.3)	
Worsened	3 (13.0)	1 (4.3)	
Umbilical artery PI			NS
Normal baseline, no change	16 (69.6)	14 (60.9)	
Abnormal baseline, no change	2 (8.7)	3 (13.0)	
Improved	5 (21.7)	6 (26.1)	
Worsened	0	0	

Improved: abnormal to normal range Doppler based on gestational age reference ranges; worsened: normal to abnormal range Doppler based on gestational age reference ranges.

NS, nonsignificant; *PI*, pulsatility index; *RI*, resistance index; *S/D*, systolic to diastolic.

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

Comment

In our RCT, no significant change in fetal well-being was noted in first time prenatal yoga performers. There was no significant change in umbilical artery Dopplers even when compared individually with gestational age reference ranges. Fetal heart rate characteristics and fetal activity remained reassuring. Maternal BP, MHR, and UA blood flow remain within normal limits after performing yoga in pregnancy.

Rakhshani et al[20] published the first study to assess Doppler changes in a prenatal yoga study in 2015. Their RCT assessed uterine, umbilical, and fetal middle cerebral artery Doppler indices at the 12th, 20th, and 28th gestational week in 59 high-risk pregnant women who either practiced yoga 3 times/week or walked twice daily for 16 weeks. A statistically significant reduction in umbilical artery S/D ratio, PI, and RI indices were noted in the yoga group, which correlated with a reduction in growth restriction in these pregnancies.[20] Conceivably, a longer duration of yoga exercises is warranted for sustained improvement of umbilical artery blood flow versus a 1-time intervention. Meanwhile, they did not demonstrate a difference in the uterine artery PI, which is consistent with our results.

Although fetal status remained reassuring after all interventions, it is interesting to note that 22% of each group had an absence of breathing after the intervention. Absence of fetal breathing in the third trimester may be caused by several mechanisms: fetal sleep-wake cycle, altered maternal catecholamine levels, maternal hypoglycemia, or maternal exercise—induced activation of chemoreceptor-mediated fetal response.[21] Even in response to maternal cardiovascular exercise, it is believed to be a transient fetal response without any effect on neonatal outcome.[21,22]

A 1-time, 1 hour intervention may lead to behavioral change in pregnancy.

TABLE 4
Maternal parameters before and after intervention

Variable	Yoga (n = 23)	Control (n = 23)	*P* value[a]
Systolic blood pressure, mm Hg			
Before	108.0 ± 12.0	106.4 ± 6.3	
After[b]	106.0 ± 10.0	106.5 ± 8.4	Group: .90 Time: .89 Interaction: .79
After[c]	106.9 ± 9.4	104.1 ± 6.0	Group: .33 Time: .20 Interaction: .69
Diastolic blood pressure, mm Hg			
Before	70.7 ± 6.9	69.3 ± 4.7	
After[b]	70.1 ± 8.5	68.9 ± 5.1	Group: .55 Time: .75 Interaction: .88
After[c]	70.1 ± 7.0	69.0 ± 5.8	Group: .46 Time: .64 Interaction: .87
Maternal heart rate, bpm			
Before	86.9 ± 13.0	87.9 ± 9.6	
After[b]	82.5 ± 9.4	82.4 ± 10.0	Group: .89 Time: < .01 Interaction: .71
After[c]	82.9 ± 12.5	81.0 ± 8.6	Group: .88 Time: < .01 Interaction: .27
Right uterine artery pulsatility index			
Before	0.86 ± 0.2	0.78 ± 0.3	
After	0.87 ± 0.2	0.83 ± 0.2	Group: .29 Time: .37 Interaction: .65
Left uterine artery pulsatility index			
Before	0.95 ± 0.2	0.96 ± 0.3	
After	0.95 ± 0.2	0.93 ± 0.3	Group: .91 Time: .72 Interaction: .76

Data are presented as mean ± SD.

[a] Repeated-measures analysis of variance: main effects are for group (yoga vs control), time (before and after intervention) and group-by-time interaction; [b] Immediately (≤ 2 minutes) after intervention; [c] Fifteen minutes after intervention.

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

Educating women on exercise or experiencing a new form of exercise led 26% of sedentary participants in each group to report that they began exercising. Of those in the control group who were informed of the ACOG recommendations on the duration and frequency of exercise in pregnancy, 53% reportedly met duration recommendations of 30 minutes and 23% met frequency recommendations during pregnancy and after delivery. Reiteration of the recommendations at subsequent prenatal visits may improve compliance with ACOG recommendations.

Our RCT had its limitations. First, because of the acute assessment of our outcomes, an intention-to-treat analysis could not be conducted. Second, although we collected delivery data, this study was not powered to detect a difference in maternal or neonatal outcomes. However, a 1-time intervention can change reported behavior for the remainder of the pregnancy, thereby potentially affecting or improving outcomes. Third, fetal well-being testing was performed after completion of the intervention, a limitation that is consistent with other prenatal exercise studies.[5,7] Doppler interrogation during yoga postures is technologically difficult. If yoga causes fetal hypoxia or distress, nonreassuring fetal well-being measures would persist for at least a short period of time after performing yoga. In our study, fetal well-being testing was reassuring after all interventions.

There were several strengths to our study. Internal validity was strengthened by utilizing the same investigator to conduct all interventions, 1 sonographer, and blinding of the MFM for data interpretation. The majority of our participants were either uninsured or covered by Medicaid; therefore, our results are applicable to an underserved population. Prior prenatal yoga studies have been mainly performed in middle to high socioeconomic status cohorts, thus limiting their generalizability.[2,23,24] We did not exclude women based on the prepregnancy or current BMI and had a BMI as high as 46 kg/m^2 in the yoga and 50 kg/m^2 in the control group. This allows for our results to extend to overweight and obese women. We utilized an array of standardized tests to assess fetal well-being including BPPs and NSTs, allowing for easy reproducibility of our study.

In conclusion, yoga is well tolerated by the fetus as assessed by standard fetal well-being indices. There is no significant change in fetal blood flow or fetal behavior acutely after performing yoga for the first time in pregnancy. Yoga can be recommended for low-risk women to begin during pregnancy. Future studies should be aimed to determine the appropriate duration of performing prenatal yoga to improve maternal and neonatal outcomes. ■

Acknowledgment

This study had a clinical trial registration number of NCT02063711 (clinicaltrials.gov, www.clinicaltrials.gov).

TABLE 5
Delivery outcomes

Characteristics	Yoga (n = 23)	Control (n = 23)
Gestational age at delivery, wks	39.5 ± 1.1	39.6 ± 1.0
BMI at delivery, kg/m^2	32.5 ± 6.3	30.6 ± 6.5
Total gestational weight gain, pounds	32.9 ± 14.2	32.8 ± 15.7
Mode of delivery		
Vaginal	13 (56.5)	13 (56.5)
Operative	2 (8.7)	1 (4.3)
Elective CD	4 (17.4)	4 (17.4)
Nonelective CD	4 (17.4)	4 (17.4)
Neonatal birthweight, g	3184.1 ± 334.2	3421.6 ± 513.8
Apgar score <7 at 5 minutes	1 (4.3)	1 (4.3)
Umbilical artery pH	7.3 ± 0.1	7.3 ± 0.1
Umbilical artery base excess	−5.3 ± 2.7	−5.4 ± 3.7

Data are presented as mean ± SD or n (percentage).

BMI, body mass index; *CD*, cesarean delivery.

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.

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SUPPLEMENTAL TABLE
Predetermined yoga sequence used for this study

Poses[a]
Seated poses
Easy seated pose (Sukhasana) (4—5 min)
Easy seated side stretch (Sukhasana side stretch)
Easy-seated forward fold (Sukhasana fold)
Cat/cow pose (Marjaryasana/Bitilasana)
Child's pose (Balasana)
Gate pose (modified Parighasana)
Crescent pose (Anjaneyasana)
Saddle pose (modified Suptavirasana)
Standing poses
Downward-facing dog pose (Ardhomukhasana)
Standing cat/cow pose (standing Marjaryasana/Bitilasana)
Lateral arc pose (Ardhakatichakrasana)
Half-sun salutations × 3 rounds
Mountain pose (Tadasana)
Forward bend (Uttanasana)
Half-forward fold (ArdhaUttanasana)
Warrior 2 pose (Virabhadrasana II)
Triangle pose (Trikonasana)
Extended side-angle pose (UtthithaParsvokonasana)
Tree pose (Vrkasana)
Pyramid pose (Parsvottonasana)
Seated poses
Head-to-knee pose (Janusirsasana)
Marichi's pose C (modified Marichyasana C open twist)
Bound angle pose (Badakonasana)
Garland pose (Malasana)
Breathing techniques (Pranayamas) (2 min)
Alternate nostril breathing (Anulomvilom Pranayama)
Final resting pose (8—10 min)
Modified corpse pose (modified Savasana)

English (Sanskrit) names are used.

[a] Each pose was held for 3—5 deep breaths (1—2 minutes).

Babbar et al. TRY yoga randomized controlled trial. Am J Obstet Gynecol 2016.