

Effect of the integrated approach of yoga therapy on platelet count and uric acid in pregnancy: A multicenter stratified randomized single-blind study

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ABSTRACT

Background: Yoga improves maternal and fetal outcomes in pregnancy. Platelet Count and Uric acid (Ua) are valuable screening measures in high-risk pregnancy.

Aim: To examine the effect of yoga on platelet counts and serum Ua in high-risk pregnancy.

Materials and Methods: This stratified randomized controlled trial, conducted by S-VYASA University at St. John's Medical College Hospital and Gunasheela Maternity Hospital, recruited 68 women with high-risk pregnancy (30 yoga and 38 controls) in the twelfth week of pregnancy. The inclusion criteria were: Bad obstetrics history, twin pregnancies, maternal age < 20 or > 35 years, obesity (BMI > 30), and genetic history of pregnancy complications. Those with normal pregnancy, anemia (< 10 grams%dl), h/o clotting disorders; renal, hepatic or heart disease; seizure disorder; or structural abnormalities in the pelvis, were excluded. The yoga group practiced simple meditative yoga (three days / week for three months).

Results: At baseline, all women had normal platelet counts (> 150x10⁹/L) with a decrease as pregnancy advanced. Ua (normal at baseline) increased in both groups. No one developed abnormal thrombocytopenia or hyperuricemia. Healthy reduction in platelet count (twelfth to twentieth week) occurred in a higher ($P < 0.001$, Chi² test) number of women in the yoga group than the control group. A similar trend was found in uric acid. Significantly lesser number of women in the yoga group ($n = 3$) developed pregnancy-induced hypertension (PIH) / pre-eclampsia (PE) than those in the control group ($n = 12$), with absolute risk reduction (ARR) by 21%.

Conclusion: Antenatal integrated yoga from the twelfth week is safe and effective in promoting a healthy progression of platelets and uric acid in women with high-risk pregnancy, pointing to healthy hemodilution and better physiological adaptation.

Key words: High-risk pregnancy; uric acid; yoga.

INTRODUCTION

Pregnancy is a very precious and important event in a woman's life and one of the happiest periods in the life of a woman. Good prenatal care with proper nutrition and medical supervision has gone a long way in reducing infant and maternal mortality in both developed and developing

countries. The complications in high-risk pregnancies include premature labor, intrauterine growth restriction, pregnancy induced hypertension (PIH), pre-eclampsia (PE), eclampsia, thrombocytopenia, and so on. Several markers have been identified that have a predictive value and are included in antenatal screening for prevention of these complications. Studies point to serum uric acid as one such marker, as hyperuricemia is associated with PIH or pre-eclampsia / eclampsia. It has been shown that women with hyperuricemia, combined with gestational hypertension, were more disposed to having a shorter gestation period, smaller birth weight, and an increased risk of pre-term or pre-mature labor.^[1] Normally a small quantity of uric acid (3.0–7.0 mg/dL) is produced, which serves as a strong antioxidant and a strong reducing substance. Although its clinical utility has been actively

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debated,^[2] it is useful to include it in routine screening in high-risk pregnancies.

Platelet count is another measure that is of value in screening high-risk pregnancies. Benign Thrombocytopenia of Pregnancy (BTP) is a physiological change, with no pathological consequences,^[3] which helps in preventing placental thrombosis and infarctions, as pregnancy is basically a hypercoagulable state.^[4] BTP during normal pregnancy is considered to be due to hemodilution that produces maternal plasma volume expansion as an important physiological adaptive mechanism, to meet the greater circulatory needs of the placenta and fetus.^[3] The conventional treatment recommended for prevention of pregnancy complications (PIH or pregnancy loss) in high-risk pregnancy is low-dose aspirin, as it suppresses the aggregation of platelets in microvascular circulation.^[5,6] To date, several studies have provided evidence of the beneficial effects of many mind-body interventions, suggesting better psycho-physiological adaptability.^[7,8] In pregnancy, yoga has been found to be beneficial in preventing complications, with better psychological and autonomic stability,^[9] and improved maternal comfort. Other benefits included lesser Caesarian sections, shorter duration of labor,^[10] reduced pre-term delivery, higher birth weight, and better Apgar scores of the infant.^[11]

There is only one earlier study by Narendran *et al.*^[12] that points to the benefits of yoga in high-risk pregnancy. There are no studies that have looked at the uric acid or platelet levels (as indication of better physiological adaptation) of women who practiced yoga for high-risk pregnancy. Hence, we planned to look at the platelet count and uric acid levels in pregnant women who practiced yoga from the twelfth to the twenty-eighth week, with a hypothesis that yoga promotes healthy progression of benign thrombocytopenia and uric acid levels, which may indicate better physiological adaptation during pregnancy.

MATERIALS AND METHODS

Design and setting

This multicenter-stratified, randomized, single-blinded controlled trial was conducted by the Vivekananda Research Foundation at the Obstetric Unit of St. John's Medical College and Hospital (SJMCH) and the Gunasheelu Maternity Hospital, in Bengaluru, India.

Subjects

This study on platelet counts and uric acid levels was a part of a larger funded project to investigate the efficacy of yoga in high-risk pregnancy. The required sample size was calculated from an earlier Japanese study,^[13] on

yoga in pregnancy. Using the ratios for occurrences of preeclampsia and the event rates between two independent groups with $<$ at 0.05 powered at 0.8 and a probability of type I error of 0.01 (formula provided at CUHK web site: <http://department.obg.cuhk.edu.hk>), a minimum sample size of 27 per group was obtained. We had 68 participants (30 yoga and 38 controls) for final analysis.

Selection criteria

All women were recruited in twelfth week of pregnancy. As the aim of this larger funded project was targeted at high-risk pregnancy, those with (a) bad obstetrics history, (b) twin pregnancies, (c) maternal age below 20 or above 35, (d) obesity (BMI greater than 30), and (e) a history of pregnancy complications among blood relatives, (sister, mother and/or grandmother) were included in the study. Those with (a) normal pregnancies without high risk, (b) a history of clotting disorders, (b) anemia ($<$ 10 grams/dl), (c) chronic renal, hepatic, or heart disease, (d) seizure disorders, and (e) structural abnormalities in the reproductive system were excluded from the study.

Ethical clearance was obtained from the Institutional Ethical Committee of both the S-VYASA University and St. John's Medical College Hospital. All qualified subjects signed the informed consent form before enrollment in the study.

Randomization

An online random number generator by Graph Pad Software (<http://graphpad.com/quickcalcs/randomize1.cfm>) was used to randomize subjects into groups. For each of the five subgroups, random number tables for randomization into two groups were generated. The group name (either yoga or control) was written on a slip of paper, folded several times, and placed in sequentially marked opaque envelopes, sealed, stamped, and kept away in a safe locker. Thus, there were five sets of sealed envelopes that had the name of the subgroups on the outside with the group name inside. When a subject belonging to one of these subgroups was recruited, she was asked to pick up one of the envelopes from the set presented to her. Following this, the research staff opened the envelope, informed the subject of the group she had been randomized into, and recorded her ID in the study log. Permitting the subjects to pick an envelope randomly, offered a second level of randomization and reduced the chances of dissatisfaction.

Blinding and masking

This was a single-blind study. The physicians, laboratory technicians, and hospital staff were blinded to the group selection. The subject could not be blinded about the

practices they were taught as this was an interventional study.

Procedure

After randomization and obtaining a signed informed consent, the sociodemographic data were recorded. The yoga group was taught a set of carefully selected simple safe meditative yoga exercises that included yogic body movements followed by breathing practices, physical exercises, pranayama, deep relaxation with guided imagery, meditation using visualization, and sound resonance. These practices were taught in the hospital premises three days/week for three months by a trained yoga instructor, followed by home practice using audio CDs. Patients in the control group were given the conventional antenatal training program offered at these two private hospitals specialized in high-risk obstetric practice (St. John's and Gunasheela) in Bengaluru, India. All assessments were made in the twelfth, twentieth and twenty-eighth weeks of pregnancy. Blood pressure, weight, urine albumin, and blood glucose levels were measured routinely at each antenatal visit.

Venous blood was drawn carefully at the antecubital vein using a vacutainer by a qualified technician and the platelet count was assessed immediately on an electronic platelet apparatus. The uric acid level was assessed in the serum using the 'Modified Uricase Method'.

Intervention

The integrated meditative yoga module for high risk pregnant women developed by a team consisting of two senior yoga faculties of the Yoga research foundation (VYASA) and an obstetrician with knowledge of yoga, was used [Table 1]. This one hour daily practice started with a prayer followed by a short session (3-5 minutes) of theory that was aimed at giving an understanding of the holistic approach of yoga. The practices were aimed at achieving a state of deep alertful rest at physical and mental level that may promote rapid adaptation to physiological or emotional challenges. The module consisted of a few preparatory loosening body movements and breathing practices, safe asanas in supine position, deep relaxation with guided imagery, pranayama and meditation using visualization and sound resonance [Table 1].

The control group received standard care plus prenatal exercises offered by the hospital. Walking for half an hour morning and evening was the standard exercise prescribed routinely. Standard care offered to both groups included: (a) Prenatal interventions offered by the two hospitals, (b) pamphlets about diet and nutrition during pregnancy, (c) frequent visits at regular intervals to the hospital, and (d) bi-weekly follow up by our staff.

Data analysis

Statistical analysis was conducted with the help of the Statistical Package for Social Sciences (SPSS)-16. The Shapiro Wilk's Test was used to test the normality of the data. As the data were normally distributed, group time interaction was checked by using repeated measures ANOVA. Between and within groups, comparisons were done using post hoc analysis with Bonferroni corrections. Subgroup analysis on the number of subjects was done by the Chi square test. Absolute risk reduction (RR = control event rate – experimental event rate) and number needed to treat (NNT = 1/Control event rate-Experimental Event Rate) for the events of HT and PIH in yoga and control groups were also calculated.

RESULTS

Figure 1 shows the trial profile. All new registrations (n = 1934) at the antenatal clinics of the two hospitals during the study period were screened. Three hundred and forty-nine met the inclusion criteria. Of these, five were excluded, as they had one of the conditions listed in the exclusion criteria. Ninety-three subjects, who consented for the study were randomized into two groups, namely, yoga and control. The reasons for non-consent were: Twenty-three did not have time; 75 lived too far away to be able to attend classes; 35 could not get the approval of their husbands or families to join the study; 37 were planning to relocate from the Bangalore metropolitan area; 71 were not interested in involvement in any form of research; 31 were fearful that the Doppler scanning could harm their babies, and the physicians could not convince them otherwise.

Table 1: Yoga interventions

Practices	Duration
Hasta āyama śvasanam (hands in and out breathing)	2 min
Hastavistāra śvasanam (hands stretch breathing)	2 mins
Gulphavistāra śvasanam (ankles stretch breathing with wall support)	1 min
Kaṭṭiparivartana śvasanam (side twist breathing)	2 min
Deep relaxation	10 mins
Uttānapādāsana śvasanam (leg raise breathing)	2 min
Setubandhāsana śvasanam (hip raise breathing)	2 min
Pādasāncālanam (cycling in supine pose)	2 min
Supta udarākarṣaṇāsana śvasanam (supine abdominal stretch breathing)	2 min
Vyāghrāsana śvasanam (tiger stretch breathing)	2 min
Deep relaxation	5 mins
Gulphagūraṇam (ankle rotation)	2 mins
Jānuphalakākarṣaṇam (kneecap contraction)	2 min
Relaxation techniques	
Deep relaxation	10 mins
Pranayama	
Nāḍīsuddhi pranayam (alternate nostrils breathing)	2 mins
Deep relaxation in matsyākṛīḍāsana (lateral shavasana)	10 mins
Meditation techniques	
Jyotirāṭaka (eye exercises)	2 mins
MIRT (mind imagery technique), guided visualization, final relaxation	30 mins

There were twenty five dropouts (sixteen from the yoga group and nine from the control group) during the course of the study. Reasons for dropout from the yoga group were: Six moved to a different town, four did not adhere to the intervention schedule, one was advised strict bed rest by the obstetrician, and four lost interest in the study. In the control group: One subject aborted, three moved away, and five did not show up for follow-up measurements. Only those who completed the assessment at the twenty-eighth week of pregnancy were included in the final data analysis. Accordingly 30 in the yoga group and 38 in the control group were available for final analysis.

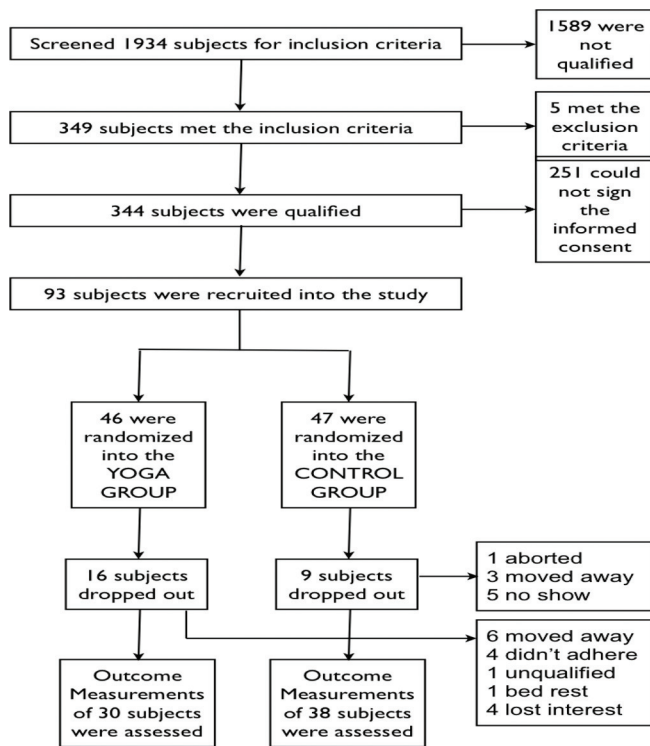


Figure 1: Trial profile

Table 2: Demography

Variable	Yoga	Control	P value
	Mean (SD) or N (%)	Mean (SD) or N (%)	
Age	27.7 (5.1)	27.2 (5.2)	0.69*
Religion			
Hindus	25 (83.3)	29 (76.3)	0.18 ^
Muslims	0	4 (10.5)	
Christians	5 (16.7)	5 (13.2)	
Family income in rupees. in thousands/annum	37.02 (29.36)	40.27 (45.12)	0.74*
Socioeconomic status	37.37 (11.28)	36.05 (8.86)	0.59*
Risk factors			
Age factor	6 (20.0)	8 (21.1)	0.96 ^
Bad history	8 (26.7)	10 (26.3)	
Diabetes	-	1 (2.6)	
Genetics	6 (20.0)	8 (21.1)	
Multiple pregnancy	4 (13.3)	4 (10.5)	
Obesity	6 (20.0)	7 (18.4)	
Systolic BP	109 (13.54)	104 (8.281)	0.083*
Diastolic BP	67.62 (9.08)	65.59 (7.94)	0.336*

*Independent-samples T-Square test; ^=Chi squared test; The baselines were matched between groups on all variables

Table 2 shows the demographic details. The mean age of the subjects in both groups was 27 years. More than 45% of the women had college and higher education. The mean scores on the socioeconomic status was 37.37 (11.28) in the yoga group and 36.05 (8.86) in the control group, indicating that both groups were in the upper middle class. There were no significant baseline differences between the two groups in any of the demographic or clinical variables.

Platelet count

All the subjects, in both groups, had normal platelet counts [mean = 263.92 (67.01)x10⁹/L] at baseline (Normal range: 150 – 450),^[14] although they were all in the high-risk category. There was a decline in platelet count as the pregnancy advanced in both groups, with a trend of a better decline in the yoga group, with no significant difference between the groups at the twentieth or twenty-eighth weeks [Table 3, Figure 2].

A subgroup analysis on the number of subjects who had increased platelet or decreased platelet counts in the two groups showed that the number of women with reduced platelet count (within normal range) was significantly higher in the yoga group than in the control group, at the twentieth (P = 0.016, Chi² = 8.32) and also in twenty-eighth week (P=0.004,chi²= 8.09).

Uric acid

None of the women in either group had high levels (Normal 2.0 – 6.5 mg / dl) of uric acid at baseline (twelfth week). There was an increase in the mean uric acid level as the pregnancy advanced, in both groups, with no significant difference between groups (P > 0.05). None of them rose above the normal upper limit of 6.5 mg / dl. There was a trend (P = 0.09) of a lesser degree of increase in uric acid

between the twelfth and twentieth week in the yoga group. The number who had a rise in the third trimester was lesser, although the *P* values did not show any significant differences between the groups [Table 4, Figure 3]. Also, there were no cases of hyperuricemia in those who developed PIH / PE in either group. The number of women who had increased uric acid toward the twenty-eighth week appeared to be higher in the control group than in the yoga group.

Pregnancy-induced hypertension / pre-eclampsia

There were 12 (37.7%) cases of PIH / PE in the control group, while only 3 (10.3%) in the yoga group, resulting in a highly significant difference between the means ($P = 0.018$, χ^2) [Table 5]. The number needed to treat (NNT) was 4.76 (i.e. needed to treat five cases of yoga to reduce one event of PIH / PE) and absolute risk reduction (ARR) was 21%, with an odds ratio of 0.24. Two of the four cases of pre-eclampsia in the control group developed eclampsia with none in the yoga group. NNT for eclampsia was 5.99 and ARR was 16.7%.^[15]

Subjective reports by participants: All those in the experimental group reported that they had a feeling of positive energy, relaxation, and well-being throughout the day after the yoga practice. They would make phone calls to the therapists whenever they felt any discomfort, such as, mild back pain, low mood, stress, or anxiety (about the progress of pregnancy), to check on the specific yoga practice to overcome these, indicating that they were keen to continue the practices regularly at home, and had experienced positive benefits in every session. There were no adverse effects reported during or after the practice of yoga.

DISCUSSION

This multicenter, stratified, randomized, prospective control study on yoga in high-risk pregnancy has shown

that there is a progressive reduction in platelets and increase in uric acid levels as pregnancy advances, in both groups. None of the cases developed hyperuricemia or abnormal thrombocytopenia. The number of women who had reduction in platelet count (within normal range) at the twentieth week was significantly ($P < 0.001$, χ^2 test) higher in the yoga group; the number who had an increase of uric acid in the third trimester (although within normal range) was significantly higher ($P < 0.001$, χ^2 test) in the control than the yoga group. The baseline mean systolic and diastolic blood pressures were normal. A significantly lesser number of women in the yoga group developed PIH / PE, when compared with the control group.

Although the effect of yoga on hemorheological and hemostatic variables has not been studied in pregnancy, several studies have looked at these variables after moderate and intense physical training in normal volunteers. Available evidence suggests that the platelet count increases after short-term exercise, with favorable effects on platelet aggregation and activation, in both men and women.^[16]

It is known that, as a part of the physiological response, the uric acid level decreases by approximately 25 to 35 percent throughout normal pregnancy.^[17] The values are significantly low by eight weeks and start increasing from the twenty-fourth week, to reach values greater than the pre-pregnancy values by term, and remain elevated until at least 12 weeks after delivery.^[18] We have observed that the values in our study group followed the same trend of lower values in twelfth week, which went on to increase as the pregnancy progressed. It is interesting to note that the curve of progression on uric acid followed the reference pattern in the yoga group, while the control group showed a steep initial rise, giving a diamond shape. It would have been useful to see whether the lines would intersect or

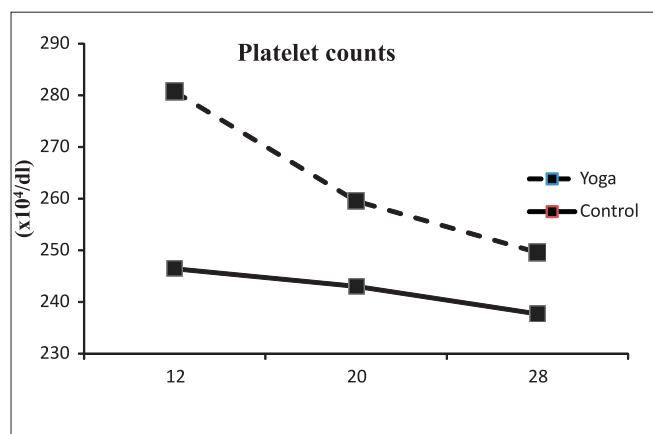


Figure 2: Platelet counts ($\times 10^4/\text{dl}$) as pregnancy advanced. Physiological drop in platelets was significant at 20th and 28th weeks in the yoga and not in the control group. Non-significant difference between groups at 20th or 28th weeks

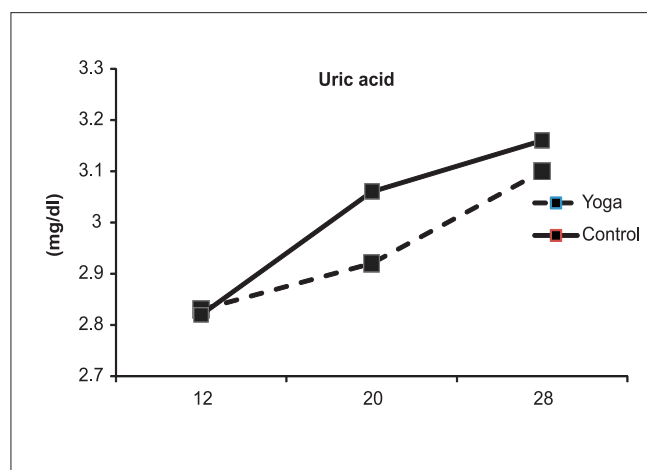


Figure 3: Uric acid (mg/dl) as pregnancy advanced. Physiological rise in uric acid was significant at 28th week in control group. Non significant difference between groups at 20th or 28th weeks

Table 3: Results after the intervention at the twentieth and twenty-eighth weeks (repeated measures ANOVA)

Variables	Weeks of gestation	Yoga			Control			Betwn groups
		Mean (Sd)	% difference	Sig P	Mean (Sd)	% difference	Sig P	
Platelets count (10 ₄ /dl)	12	280.67 (78.57)		-	246.43 (59.6)		-	ns
	20	259.54 (77.41)	7.52 (12 th -20 th)	0.014	243.04 (56.01)	1.37 (12 th -20 th)	ns	ns
	28	249.58 (81.62)	11.07 (12 th -28 th)	0.006	237.7 (72.04)	3.54 (12 th -28 th)	ns	ns
Uric acid (mg/dl)	12	2.83 (0.80)			2.82 (0.63)		-	ns
	20	2.92 (0.74)	3.24	ns	3.06 (0.59)	8.26	0.002	ns
	28	3.10 (0.71)	9.60	0.09	3.16 (0.82)	11.92	0.012	ns
BP systolic (mm of Hg)	12	108.00 (13.25)			104.03 (8.03)			ns
	20	107.91 (12.57)	-0.08	ns	104.63 (11.87)	0.58	ns	ns
	28	109.65 (9.15)	1.53	ns	108.77 (9.31)	4.55	0.032	ns
BP diastolic (mm of Hg)	12	66.96 (9.54)			64.57 (7.91)		-	ns
	20	65.43 (8.62)	-2.28	ns	64.23 (7.93)	-0.53	ns	ns
	28	68.13 (7.42)	1.75	ns	66.3 (8.07)	2.68	ns	ns

Table 4: Number of women with increased and decreased platelets and uric acid values (Chi squared test)

Variables	Changes	12 th to 20 th week				12 th to 28 th week			
		Yoga	control	Chi ²	p	Yoga	control	Chi ²	Sig (P)
Platelet count	Increased	6	20	8.09	0.004	5	15	NS	NS
	Decreased	24	17			20	22		
	No change	0	1			0	1		
Uric acid	Increased	10	9	NS	NS	7	8	NS	NS
	decreased	20	29			23	26		
	No change	0	0			0	0		

Table 5: Numbers who developed PIH/PE in subgroups with increase or decrease in serum uric acid

Group	Increased	Decreased	Total	Chi-square (pearson's)
	n	n	n	
Yoga	1	2	3	0.009
Control	8	4	12	

move parallel in the third trimester and after delivery, if the data were available beyond 28 weeks of gestation.

The mean values in our study were much lower at all stages of pregnancy [Figure 2] when compared with American women with high risk.^[19] These differences may be due to the fact that Indian women consume lesser quantities of animal protein than American women, and there are no published data on uric acid levels in Indian women during normal or high-risk pregnancy.

Yoga is known to induce beneficial effects on the physiological, biochemical, psychological, and cognitive functions, with a significant influence on blood coagulation and other metabolic processes. Chohan *et al.*^[20] looked at blood coagulation in normal adults, who underwent a combination of yogic exercises for one hour daily for four months, and noted that yoga induced a state of blood hypocoagulability. The changes that occur during pregnancy create a hypercoagulable milieu, which is thought to be protective especially at the time of labor, for preventing excessive hemorrhage.^[21] A physiological fall in platelet count first becomes apparent in the mid-second to third trimester of pregnancy. The reason for this benign physiological thrombocytopenia, although not clear, appears

to be relative due to the increased plasma volume resulting from hemodilution.^[22] Increased platelet consumption by the physiological hypercoagulability^[23] or decreased platelet production^[22] seem to be the other contributory factors.

The serum concentration of uric acid is determined by several factors during pregnancy, including dietary intake of purines, metabolic production of uric acid by the mother, fetus, and placenta, as well as renal and gastrointestinal excretion.^[24] The decrease in uric acid levels during early pregnancy has been attributed to: (a) Hemodilution^[25] and (b) increased glomerular filtration rate, which goes up by as much as 50% by the beginning of the second trimester^[26] and / or (c) reduced proximal tubular reabsorption.^[26]

De-Weerth *et al.*^[27] observed that psychological stresses dampen the physiological adaptation during pregnancy. It is proposed that the endocrine and inflammatory responses to psychological stress results in poor pregnancy outcomes, due to alteration of blood flow in the maternal-fetal compartment, primarily as a result of vasoconstriction.^[28] Psychological stress leads to stress-hemoconcentration, which is possibly due to a decrement in plasma volume, as observed in patients with mild-to-moderate depression.^[29] Wong *et al.*^[30] also showed that these measures of stress-hemoconcentration improved after antidepressant treatment. Stress induces thrombogenesis that can result in many detrimental effects. A systematic review by Thrall *et al.*^[31] has reported that psychological stress and high levels of physical activity are associated with robust changes that lead to hypercoagulable states.

Several studies have shown the stress-reducing effects of yoga.^[32,33] In a randomized controlled trial (RCT) that looked at the effect of integrated yoga in normal pregnancy, reduction in stress levels with better quality of life has been observed.^[34] We^[10] have also shown an increased sensitivity of the autonomic nervous system through heart rate variability, which showed that the immediate parasympathetic response to a guided yogic deep relaxation practice in the third trimester, in women who practiced yoga, was significantly better than those who practiced only antenatal exercises.

We hypothesize that the favorable changes in platelet counts (within normal range) and uric acid levels, with better pregnancy outcome (lesser PIH / PE / E) observed in the yoga group, was due to improved physiological adaptability resulting in improved physiological hemodilution of pregnancy and better blood flow. This may explain the lesser degree of rise in uric acid (although not significant) and lesser number of cases of PIH/PE in the yoga group, as compared to the control group.

Strength of the study

The major strength of the study was the design with stratified randomization, with rater blinding, as the staff involved with the assessments were blind to the group treatment status. This is the first study that has shown the safety of yoga in high-risk pregnancy and its influence on platelets and uric acid values, hinting at understanding the mechanism.

Validity and implications

Monitoring platelet counts and uric acid levels in high-risk pregnant women is useful to predict the appearance of complications. As indirect indicators of hemodilution, these measurements help in understanding how yoga can help in better pregnancy outcomes. The results of this study seems to provide the first ever scientific evidence for the efficacy of yoga in improving hemodilution (healthy progression of benign thrombocytopenia and uric acid levels), as an indicator of better physiological adaptation. This study is another evidence, after Narendran's study,^[12] which points to the benefits of yoga in high-risk pregnancy. We recommend inclusion of this safe module of integrated yoga in all antenatal training programs for high-risk pregnancies.

Limitations of the study

The limitations of the study were: (1) The higher number of dropouts in the yoga ($n = 16$) than in the control group ($n = 9$). Several subjects from both groups had to go to their native places (unplanned) from time-to-time; this

accounted for much larger dropouts in the yoga group (four subjects) than in the control group. (2) It was expected that subjects would practice the yoga taught in the intervention sessions at home, at least once a day. However, as there were no checks to supervise the patient, the possibility of lack of adherence (although our team made regular phone calls) could not be ruled out. (3) Subjects were selected on the basis of high risks, but not on the basis of their platelet counts or uric acid levels. Recruitment of subjects with thrombocytopenia or abnormal uric acid levels would have been a better design to study the effect of yoga on these variables. (4) The data on platelets and uric acid were not recorded after the twenty-eighth week of gestation or after delivery.

Suggestions for future studies

Future studies may be designed to study the effect of yoga in those with hyperuricemia which may also include a battery of other measures, including Doppler studies to understand the holistic mechanism of yoga. Suitable studies may be designed in future to look at the effect of yoga on uric acid and platelet counts at term and after delivery.

CONCLUSION

This RCT provides evidence that a cost-effective module of integrated yoga is safe and useful in promoting normal physiological adaptation in women with high-risk pregnancy, as indicated by the healthy progression of platelet and uric acid levels that has reflected as lesser incidence of PIH/PE.

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