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Original Article

# Effect of Slow Pranayama on Heart Rate Variability in Pregnant Women with Preeclampsia

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**ABSTRACT**

**Background and Aim:** Hypertension is one of the common medical problems encountered in 10% of all pregnancies. Pre-eclampsia (PE), a hypertensive disorder during pregnancy has adverse pregnancy and cardiovascular (CV) outcomes. Though anti-hypertensive drugs are used in the management of pregnancy induced hypertension, termination of pregnancy alone offers complete cure. Hence optimizing the health care for pregnant women is an important step to achieve sustainable development objectives, prevention and treatment of hypertensive disorders. While studies have shown the beneficial effects of yoga on high-risk pregnancies, this randomized control trial investigated the effect of slow pranayamas on heart rate variability and CV risks in pregnant women diagnosed with preeclampsia. **Methods:** A total of 101 pregnant women who were diagnosed with pre-eclampsia were recruited from Women and Children Hospital, JIPMER and were randomized into yoga and control groups. The yoga group (n=48) received standard anti-hypertensive medication along with slow pranayamas, 2 times a day for 4 weeks between 20-34 weeks of gestation. The control group (n=53) received only standard anti-hypertensive medications during the same period. Heart rate, blood pressure and heart rate variability were assessed before and after 4 weeks. **Results:** Significant decrease in heart rate and blood pressure was seen in in pranayama group compared to control group. Also, LFnu and LF-HF ratio decreased significantly and HFnu increased significantly in pranayama group compared to control group. **Conclusion:** Four-week practice of slow pranayamas significantly improved the parasympathetic activity and decreased the sympathetic activity and reduced CV risks in preeclamptic pregnant women.

**Key words:** Pre-eclampsia, Heart rate variability, Cardiovascular risks, Pranayamas, Yoga.

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## INTRODUCTION

Hypertension is one of the common medical problems encountered in 10% of all pregnancies.[1,2] In 2014, systematic analysis done by WHO revealed that hypertensive disorders of pregnancy accounts for about 14% of maternal death in developing nations and affects 10.3% of maternal life in Southern Asia.[3] Hypertensive disorders of pregnancy include pre-eclampsia, eclampsia, chronic hypertension and gestational hypertension.[4] Among these disorders, Pre-eclampsia (PE) accounts to 70% of the hypertensive disorders in pregnancy with major negative impact on pregnancy outcome as well as maternal and fetal morbidity and mortality. Though anti-hypertensive drugs are used in the management of pregnancy-induced hypertension, termination of pregnancy alone offers complete cure.[1] Hence optimizing the health care for pregnant women is an important step to achieve sustainable development objectives, prevention and treatment of hypertensive disorders.

In developing countries, the incidence of preeclampsia ranges from 1.8% to 16.7% which 7 times higher than worldwide incidence which is 3% to 8%.[5-7] In Indian population, it is reported to be 5 to 15% of which the incidence is 16% in primigravidae and 7% in multigravidae.[8-10] About 77% of pregnant women who are suffering from PE has very little knowledge about the disease.[11] Poor knowledge about the medical care available for the pregnant women and poverty has been attributed to high incidence of the disease.[12] Preeclampsia is one of the important health problems in pregnant women with potential fetal complications such as growth retardation, prematurity, low birth weight and death. And maternal complications such as HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome, cerebral edema accompanied by seizures, renal failure and death.[13] Even though our understanding about the pathophysiology of preeclampsia has considerably increased and with advancement in research, preeclampsia continues to pose a major threat in its management. Contribution of placental factors to the disease has been proved by the decline in disease progression post-natal period. There is decreased secretion of vasodilators and increased secretion of vasoconstrictors caused

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by vascular endothelium dysfunction due to placental factors.[14] Increase in oxidative stress factors and vascular inflammation has also been attributed to the genesis of increase in blood pressure in pregnant women.[15,16]

The role of sympathetic over activity in causing essential hypertension and endothelial function has been established by studies.[17,18] In normal pregnancy the sympathetic discharge gradually gets elevated during the third trimester and in pregnancy induced hypertension (PIH), it gets elevated even in the first trimester.[18] The autonomic imbalance caused in PIH has been mainly attributed to vagal inhibition.[19] The CV risk associated with the hypertension continues till the postpartum period even though the blood pressure subsides after the delivery of placenta.[20] Though the mechanisms of CV risk that develops during PIH has not been established. Assessment of BP variability (BPV) in various clinical conditions has shown a decreased Baroreflex sensitivity (BRS) which is a marker of CV risk.[21] Decrease in BRS has also been associated with inflammation and oxidative stress in people who are in the risk of developing hypertension.[22]

Lifestyle modification has been universally accepted as one of the first line management in many non-communicable diseases. Yoga practices have been reported to reduce blood pressure and various CV risks.[23] Pranayama as a yogic principle is more important than other modalities of yogasanas for maintaining body homeostasis and in maintaining optimal health.[24] Studies have shown that practice of slow breathing exercises, especially specific nostril breathing ensures autonomic balance and stable CV functions in adults.[25] Thus, the practice of pranayama in conjunction with pharmacologic therapy in preeclampsia patients could lead to reduction in CV risks and a favourable pregnancy outcome. Till date, here is no literature to exclusively validate the effects of slow pranayamas and relaxation therapy on CV risks and pregnancy outcomes in preeclampsia.

# MATERIALS AND METHODS

## Study Design

This randomized control trial was conducted after receiving approval from the JIPMER Scientific Advisory committee and Institute Ethics Committee for human studies. This study was conducted in the Autonomic Function Testing (AFT) Laboratory and Cardio vascular Research Laboratory (CVRL) Laboratory, Department of Physiology, JIPMER.

## Sample Size

Sample size of 64 in each group is calculated using the statistical formula for comparing two independent means. The minimum expected difference in systolic blood pressure (SBP) between the groups is 4 mmHg and the sample size were estimated at 5% level of significance and 80% power.[25]

## Study Participants

Pregnant women complicated with preeclampsia attending antenatal OPD or admitted in WCH of JIPMER volunteering for the study were recruited. Study participants which consisted of pregnant women with preeclampsia (n=48) received slow pranayamas along with their standard anti-hypertensive medication, whereas control group (n=53) received only standard anti-hypertensive medication.

### *Inclusion criteria*

1. Age: 18-40 years
2. Pregnant women with gestational age between 20-34 weeks
3. Pregnant women complicated with preeclampsia, diagnosed based on ACOG criteria 2013 as given below[10]
4. Patients on labetolol and/or nifedipine
5. Willing to undergo yoga

### *Exclusion criteria*

1. Known cases of diabetic pregnant women
2. Pregnant women having known renal disease
3. Patients on alpha methyl dopa
4. Patients undergoing any form of yoga therapy
5. Patients who are not fit for practicing yoga and not willing to participate in the study

## Recording Procedure

Pregnant women complicated with pre-eclampsia were shifted to AFT laboratory of the Physiology department at 8am along with their attenders on the day of recording. Participants were requested to avoid caffeine, alcoholic beverages, physical activities and drugs known to affect autonomic nervous system after consulting with the treating physician. Before the commencement of the study, written informed consent was obtained from the participants. Participants were explained about the recording procedure to ease their anxiety. Relevant medical history was taken. The recordings were done with loose, comfortable clothing in a quite ambience and temperature (24-26°C) controlled room. The following parameters were recorded before and after the intervention. The schematic representation of recording procedure is represented in Figure 1.

## Recording of Anthropometric and BP Parameters

Height in millimeter was measured using a wall mounted stadiometer and the body weight was recorded with a spring balance to the nearest half a kilogram avoiding zero and parallax errors. BMI was calculated using Quetelet's index. Blood pressure was measured using automated BP monitor (Omron SEM 1). The cuff size of the equipment was 121 mm in width, length 446 mm and the cuff tube length were 600 mm. The participants were made sit in upright position in an armed chair with forearm resting on the arm of the chair. The BP cuff was tied on the arm approximately 2 cm above the cubital fossa with cuff being neither too tight nor loose. SBP, DBP and basal heart rate (BHR) were recorded using the instrument. SBP, DBP and BHR were recorded at an interval of

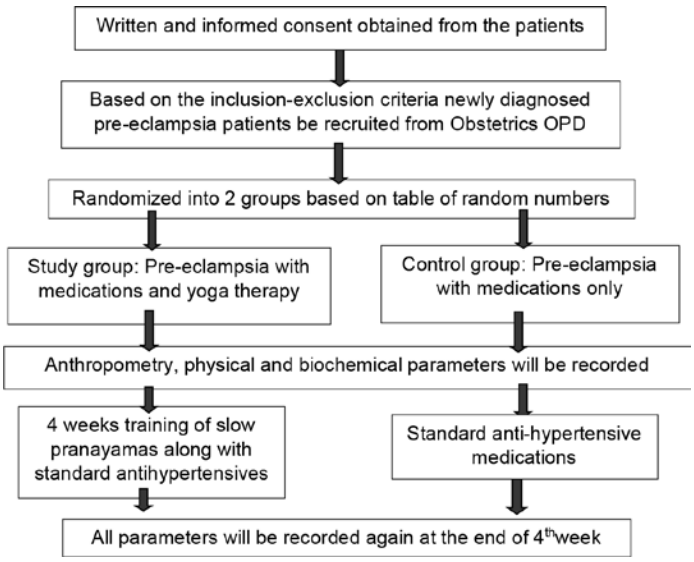


**Figure 1:** Schematic representation of recording procedure involved in the study.

5 min in each arm twice and the mean of the 4 recordings was considered for each parameter for every participant. Rate pressure product (RPP) was calculated using the formula: RPP = SBP × Heart rate × $10^{-2}$

### Recording of short-term heart rate variability (HRV)

The participants were given supine rest for 15 min following which lead II ECG was recorded for 5 to 10 min for short-term heart rate variability (HRV) analysis as per the guidelines of European task force.[26] The PowerLab 8/30 ML 870 data acquisition system with Lab chart pro software were used to acquire ECG samples at 500 samples per second for each channel. Careful analysis for ectopic and artifacts were done to be removed in the acquired 5 min ECG which was filtered with band pass filters. Thresholding algorithm of the Lab chart pro software detected the R-waves in the ECG. From the acquired recording, the RR tachogram was then extended in a text format. The frequency domain and time domain analysis of HRV was done using Kubio's HRV (version 2.2 Finland) software. Fast Fourier transformation was used for power spectral analysis. RMSSD, SDNN, NN50 and pNN50 were time domain parameters whereas Total power (TP), normalized unit of LF (LFnu), normalized unit of HF (HFnu) and ratio of low-frequency to high-frequency are frequency domain parameters.

### Intervention: Slow Pranayamas

The participants who were admitted in the OBG ward were given the following yoga intervention twice a day for 4 weeks by a qualified yoga trainer. The participants who were discharged were asked to practise in home and later cross verified with their attenders during their visit to OPD's and encouraged to practise the same through phone calls.

The following schedule of the yoga intervention (slow pranayamas) as listed in Table 1 was given following which post interventional recordings were made.

### Statistical Analysis of Data

Statistical analysis was performed by SPSS version 19 (SPSS software Inc., Chicago, USA). The data were subjected to Kolmogrov-Smirnov normality test. All the data were expressed as mean ± SD. The comparison of continuous variables between the two groups was done by unpaired student's *t*-test. The pre and post values within the group were analysed using paired t-test. The maternal and fetal outcome parameters in each group were compared with the difference between SBP of pre and post values using unpaired *t*-test. The linear relation of LF-HF ratio BP and RPP was assessed by Pearson correlation analysis and Spearman's correlation test as non-parametric test wherever appropriate. The independent contribution of RPP to LF-HF ratio in PE was evaluated by simple regression analysis. The P-value of less than 0.05 was considered to be statistically significant.

**Table 1: List and duration of yoga intervention given to study group.**

| Sl. No. | Name | | Duration |
|---|---|---|---|
| 1 | Free Hand Exercises | | 2 min |
| 2 | Slow Pranayamas | Anulom-Vilom | 5 min |
| | | Chandranadi | 5 min |
| | | Bhramari | 5 min |
| | | Sheetali | 5 min |
| 3 | Shavasana | | 3 min |
| Total | | | 25 min |

## RESULTS

We recruited 101 pregnant women diagnosed with preeclampsia, of which 53 and 48 were randomized to control and study group respectively. The anthropometric and demographic characteristic of the study population is shown in Table 2. Both the groups were comparable in baseline anthropometric parameters with no significant difference.

### Cardiovascular Parameters

The comparison of cardiovascular parameters like Heart rate (HR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean arterial pressure (MAP), Rate pressure product (RPP) within the control and intervention groups was shown in Table 2. There was statistically significant increase in BHR in control group after 4 weeks was observed but which may not be clinically significant (83.96 ± 7.04 Vs 85.19 ± 6.25, P=0.02). In the study group, there was a significant decrease in SBP (127.31 ± 9.39 vs 121.79 ± 8.38, P < 0.001), DBP (76.42 ± 5.08 Vs 71.96 ± 4.74, P < 0.001), MAP (93.38 ± 6.16 Vs 88.56 ± 5.55, P < 0.001), RPP (106.11 ± 11.71 Vs 98.63 ± 9.63, P < 0.001) from baseline after 4 weeks. Between the groups comparison regarding cardiovascular parameters is shown in Table 2. Study group showed significant decrease in SBP (121.79 ± 8.38 Vs 127.09 ± 7.61, P<0.001), DBP (71.96 ± 4.74 Vs 76.91 ± 4.63, P<0.001), MAP (88.56 ± 5.55 Vs 93.63 ± 5.18, P<0.001), MAP (88.56 ± 5.55 Vs 93.63 ± 5.18, P<0.001), RPP (98.63 ± 9.63 Vs 108.52 ± 12.79, P<0.001).

### HRV Parameters

The frequency domain indices at baseline and after 4 weeks of within the control group and within the study group are shown in Table 2. There was no significant change seen in control group. In the study group baseline Vs post intervention values showed a significant change in Total power of HRV (TP: 702.06 ± 383.73 Vs 951.06 ± 393.73, P< 0.001), normalized low-frequency (LF) power (LFnu: 59.52 ± 22.08 Vs 46.39 ± 17.32, P=0.016). Normalized high-frequency (HF) power (HFnu: 40.47 ± 18.27 Vs 53.60 ± 19.24, P=0.010) and LF-HF ratio (1.47 ± 0.80 Vs 0.86 ± 0.41, P=0.003).

The frequency domain indices at the end of 4 weeks between control and study group is shown in Table 2. There was a significant increase in the total power in intervention group observed (707.25 ± 309.61 Vs 951.06±393.73, P<0.001). All other frequency indices were significantly lesser in intervention group compared to control (P<0.001).

The changes in time domain indices of Heart rate variability (HRV) such as RMSSD. SDNN, NN50, pNN50 in control and study group is also shown in Table 2 respectively. There was no significant change observed in control group from baseline. The study group showed a significant increase from baseline in RMSSD (P<0.001), SDNN (P<0.001), NN50 (P=0.015). Comparison of post time domain indices between control and intervention group is shown in Table 2. There was a significant increase in post values of RMSSD (P<0.001), SDNN (P<0.001), NN50 (P<0.001), pNN50 (P<0.001) in study group compared to control.

The correlation of LF-HF ratio with RPP is shown in Table 3 and simple regression analysis of LF-HF (as dependent variable) and RPP (as independent variables) in study group post values are shown in Table 4.

## DISCUSSION

The incidence of pregnancy-induced hypertension (PIH) leading to pre-eclampsia has reported to be increased recently in developing countries like India, which has been attributed to the increased psycho-social stress in women, rapidly changing life style and work stress and prevalence of obesity. Recently we have studied the role of autonomic imbalance in the genesis of pregnancy-induced hypertension (PIH), and we have reported

**Table 2: Comparison of Heart Rate Variability (HRV) parameters before intervention (Pre) and after intervention (Post) between control group (received standard treatment) and study group (received standard treatment and yoga) of pregnant women diagnosed with pre-eclampsia.**

| Parameters | Control Group | | Study Group | |
|---|---|---|---|---|
| | Pre (n=53) | Post (n=53) | Pre (n=48) | Post (n=48) |
| Age | 26.04 ± 3.70 | | 24.69 ± 3.54 | |
| Weight (kg) | 71.0 ± 5.30 | | 69.80 ± 4.90 | |
| **BP Parameters** | | | | |
| HR (per min) | 83.96 ± 7.04 | 85.19 ± 6.25 | 85.13 ± 5.04 | 80.93 ± 4.71***,††† |
| SBP (mmHg) | 128.94 ± 9.27 | 127.09 ± 7.61 | 127.31 ± 9.39 | 121.79 ± 8.38***,††† |
| DBP (mmHg) | 77.13 ± 5.66 | 76.91 ± 4.63 | 76.42 ± 5.08 | 71.96 ± 4.74***††† |
| MAP (mmHg) | 94.40 ± 6.54 | 93.63 ± 5.18 | 93.38 ± 6.16 | 88.56 ± 5.55***,††† |
| RPP (mmHg/min) | 108.57 ± 14.73 | 108.52 ± 12.79 | 106.11 ± 11.71 | 98.63 ± 9.63***,††† |
| **HRV Parameters** | | | | |
| TP ($ms^2$) | 692.55 ± 281.72 | 707.25 ± 309.61 | 702.06 ± 383.73 | 951.06±393.73***,††† |
| LFnu | 57.20 ± 24.13 | 58.72 ± 25.88 | 59.52 ± 22.08 | 46.39 ± 17.32***,††† |
| HFnu | 42.79 ± 19.48 | 41.28 ±18.13* | 40.47 ± 18.27 | 53.60 ± 19.24***,††† |
| LF-HF ratio | 1.44 ± 0.70 | 1.46 ± 0.67 | 1.47 ± 0.80 | 0.86 ± 0.41***,††† |
| RMSSD | 24.06 ± 14.69 | 22.64 ± 11.51 | 27.74 ± 17.89 | 32.55 ± 14.42***,††† |
| SDNN | 28.56 ± 14.91 | 27.87 ± 12.07 | 29.91 ± 12.27 | 36.32 ± 18.33***,††† |
| NN50 | 9.13 ± 5.75 | 10.75 ± 5.16 | 12.85 ± 8.49 | 17.84 ± 9.36*,††† |
| pNN50 | 3.06 ± 1.12 | 3.86 ± 1.64 | 4.12 ± 2.04 | 6.20 ± 3.81*,††† |

Data presented are mean ± SD. The P < 0.05 was considered statistically significant.

HR: Heart rate; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; MAP: Mean arterial pressure; RPP: Rate-pressure product; TP: Total power of HRV; LFnu: Normalized low-frequency (LF) power; HFnu: Normalized high-frequency (HF) power; RMSSD: The square root of the mean of the sum of the squares of the differences between adjacent NN intervals; SDNN: Standard deviation of normal to normal interval; NN50: The number of interval differences of successive NN intervals greater than 50; pNN50: The proportion derived by dividing NN50 by the total number of NN intervals.

The star* mark indicates comparison of data of pre with post in their respective control and study groups (* P < 0.05; ** P <0.01; *** P <0.001). The cross† mark indicates comparison of data of post - control with post in study group († P < 0.05; †† P < 0.01; ††† P < 0.001).

**Table 3: Correlation of LF-HF ratio with heart rate, MAP and RPP in PRE and POST of Study group subjects.**

| | Study Group (POST) | | Study Group (PRE) | |
|---|---|---|---|---|
| | *r* | P | *r* | P |
| HR | 0.092 | 0.196 | 0.235 | 0.038 |
| MAP | 0.156 | 0.124 | 0.295 | 0.015 |
| RPP | 0.178 | 0.110 | 0.356 | 0.004 |

The P value less than 0.05 was considered significant.

*r* : Correlation coefficient

LF-HF Ratio: Ratio of low frequency to high frequency power of heart rate variability. BHR: Basal heart rate; MAP: Mean arterial pressure; RPP: Rate pressure product.

**Table 4: Simple regression analysis of LF-HF (as dependent variable) with RPP (as independent variables) in study group (POST).**

| | Independent variables | Regression coefficient of standardized β | 95% C.I. Lower limit | P values Upper limit |
|---|---|---|---|---|
| RPP | 0.152 | -0.002 | 0.062 | 0.086 |

The *P* value less than 0.05 was considered significant.

C.I.: 95% confidence interval of unstandardized β;

LF-HF Ratio: Ratio of low frequency to high frequency power of heart rate variability, RPP: Rate-pressure product.

the alteration in LF-HF ratio, as marker of sympathovagal imbalance in prediction of PIH.[18,19] In the present study, we have assessed the HRV and CV risks in women who had pre-eclampsia, following a short-course (four-week) yoga therapy consisting mainly structured slow pranayamic breathing. Though BP normalizes after delivery in PIH/pre-eclampsia, there are reports that metabolic alterations continue to persist in post-partum period.[5] Also, pre-eclampsia has been established as a future CV risk in these women.[6] However, to best of our knowledge no study has been conducted till date to assess the status of HRV and cardiometabolic risks following a short-course of yoga therapy in pre-eclamptic women.

As age and BMI are known to affect autonomic functions and CV risk parameters, in the present study we had taken age and BMI-matched subjects in both the groups (Table 2). The change in basal heart rate and blood pressure parameters (SBP, DBP and MAP) were not statistically different between pre- and post-data of control group (Table 2), which indicates that conventional management of pre-eclampsia does not lead to significant alteration in these parameters. However, significant decrease in heart rate and BP parameters in post-study group compared to pre-study group (Table 2) and compared to the data of control group suggest that yoga therapy of four weeks duration was adequate to decrease the level of hypertension in pre-eclamptic women.

The study group subjects had significantly decreased marker of sympathetic activity (decreased LFnu) after four-weeks of yoga therapy compared to their own pre-yoga values and compared to that of control

subjects (Table 2), indicating that the pre-eclamptic women who had higher levels of sympathetic activity had adequate reduction in sympathetic drive after yoga practice. The LFnu of HRV is the marker of cardiac sympathetic drive.[26] Thus, the findings of the present study are in conformity with our previous reports[18,19] and few earlier studies indicating that PIH/preeclampsia is a state of sympathetic overactivity, which is normalized after a short course of pranayama practice. The diastolic blood pressure, which is an index of peripheral vascular resistance, was also significantly reduced in study group compared to control group following pranayamic yoga practice. Diastolic BP reflects the basal sympathetic vasoconstrictor tone.[27] Thus, it appears that the increased sympathetic activity had resulted in elevated blood pressure in pre-eclamptic women in the present study.

Heart rate (HR) at rest is the function of cardiac vagal tone and decrease in HR represents increased parasympathetic activity.[28] Recent reports demonstrated that increase in resting HR is a risk factor for CV disease.[29] Thus, the decrease in HR in study group in our present study after four weeks of pranayama practice indicates the increased vagal tone and decreased CV risks in pre-eclamptic women undergoing yoga therapy. This was supported by increased HFnu in these study group subjects after yoga practice (Table 2), which indicates the increased cardiac vagal drive in these pregnant women. Further, all the time domain indices of HRV such as RMSSD, SDNN, NN50 and pNN50 were significantly increased in study group after yoga practice compared to control group of pre-eclamptic women (Table 2). Time domain indices of HRV represent vagal drive to the heart and increase in these indices reflects induced cardiac vagal modulation.[26] Among time domain indices, RMSSD is considered an important marker of cardiac beat to beat parasympathetic drive. Significantly increased RMSSD in study group subjects following pranayama practice, confirms the significantly elevated parasympathetic modulation of heart activities in these women having pre-eclampsia.

LF-HF ratio in the resting state of a person indicates sympathovagal balance. Decrease in this ratio signifies sympathovagal balance owing mainly to decreased sympathetic activity.[26] LH-HF ratio was significantly decreased in study group following yoga practice compared to the control group (Table 2). Further, LF-HF ratio was well correlated with BHR, MAP and RPP, indicating that autonomic homeostasis is the key to the cardiovascular stability in these women. Total power (TP) of HRV is a marker of overall strength of cardiac vagal modulation and increase in TP is considered as the power of increase in heart rate variability.[26] In the present study, TP was significantly increased in all the study group subjects compared the control group subjects (Table 2) following pranayama practice. Decreased resting heart rate and increase in TP (increased HRV) have been reported to be the markers of improved cardiac health.[30] Thus, findings of the present study indicate the decreased vulnerability of pre-eclamptic women to CV risks after a short-course of pranayama practice.

Rate pressure product (RPP) was significantly reduced in study group subjects compared to control subjects following pranayama practice (Table 2). RPP is a measure of myocardial work load and oxygen consumption and increase in RPP indicates myocardial work stress.[31] These findings indicate that there is considerable reduction CV risk is in pre-eclamptic women after four-week practice of pranayama. LH-HF ratio was significantly correlated with RPP (Table 3) and had significant independent contribution to RPP (Table 4), indicating that decreased RPP the marker of decreased CV risk is linked to improvement in autonomic balance following four-weeks practice of slow pranayama. Thus, decreased resting heart rate, increased TP and decreased RPP as observed in the study group subjects in the present study following yoga practice makes these women less vulnerable to CV morbidities.

## CONCLUSION

The pregnant women diagnosed with pre-eclampsia have sympathovagal imbalance (increased LF-HF Ratio) and higher CV risks (increased RPP). The HRV was improved and RPP was decreased in women who had practiced four-weeks of yoga breathing (study group) compared to the women who did not practice yoga breathing (control group I). Yoga decreases the risk of CV morbidities in preeclamptic women (by decreasing RPP) even after practice of just four months pranayama. The yoga module in our study was a combination of four different types of slow pranayamas. Slow pranayamas are known to improve vagal tone and decrease sympathetic tone. The improvement of HRV and reduction in CV risks by four-weeks practice slow pranayama in preeclampsia is the novelty of the present study.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## ABBREVIATIONS

**PE:** Pre-eclampsia; **CV:** Cardiovascular; **BRS:** Baroreflex Sensitivity; **HRV:** Heart Rate Variability; **TP:** Total Power; **LFnu:** Normalized Unit of LF; **HFnu:** Normalized Unit of HF; **HR:** Heart Rate; **SBP:** Systolic Blood Pressure; **DBP:** Diastolic Blood Pressure; **MAP:** Mean Arterial Pressure; **RPP:** Rate Pressure Product.

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