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## EFFECTIVENESS OF ANTENATAL EXERCISES AND YOGA ON BIOPHYSIOLOGICAL PARAMETERS LIKE TEMPERATURE, PULSE, RESPIRATION AND BLOOD PRESSURE AMONG ANTENATAL WOMEN

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### ABSTRACT

Safe maternity with improved neonatal outcome is expected on proper antenatal care services. Exercise has become a fundamental aspect of women's lives and an important constituent of antenatal care. The aim of the study includes to evaluate the effectiveness of antenatal exercises with yoga on biophysiological parameters like temperature, pulse, respiration and blood pressure among antenatal women. The research design adopted to this study includes "True-experimental, pre-test, post-test control group design". sample: antenatal mothers who are in second trimester of pregnancy. Sampling technique: simple random sampling technique was adopted based on inclusion criteria. The study sample includes 200, 100 in experimental group and 100 in control group. Results of the study revealed that related to temperature. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.511 and <0.015, C-Pre-Multi and C-Post-Multi are 2.318 and <0.025 E-Pre-Pri and E-Post-Pri are 2.045 and <0.046 which were significant at 1% level. Pulse rate: The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 3.642 and <0.001 which was significant at 1% level, E-Pre-Pri and E-Post-Pri are 2.856 and <0.006 and E-Pre-Multi and E-Post-Multi are 2.182 and <0.034 respectively. Both were significant at 1% level. Respiration rate: The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.378 and <0.021 which was significant at 1% level, E-Pre-Pri and E-Post-Pri are 3.066 and <0.004 and E-Pre-Multi and E-Post-Multi are 2.271 and <0.028 respectively. Both were significant at 1% level. Systolic blood pressure: The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.133 and <0.038, C-Pre-Multi and C-Post-Multi are 2.551 and p=0.014. E-Pre-Pri and E-Post-Pri are 3.128 and <0.003 and E-Pre-Multi and E-Post-Multi are 3.319 and <0.002 respectively. All are significant at 1% level. Diastolic blood pressure: E-Pre-Pri and E-Post-Pri are 3.908 and <0.001 and E-Pre-Multi and E-Post-Multi are 4.307 and <0.001 respectively. Both were significant at 1% level. The study findings concluded that antenatal exercises and yoga were very effective interventions in maintaining biophysiological parameters. In experimental group it was noticed that slight decrease in all biophysiological parameters and increased comfort to the mothers.

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### INTRODUCTION

A mother nurtures and carries a baby for nine long months and hopes that the baby comes to the world as healthy. Many mothers like to have a normal vaginal delivery which is considered best for both the mother and the baby. Largely health of a baby is dependent on the mother's diet and physical activity levels.

Safe maternity with improved neonatal outcome is predicted on proper antenatal care services. Exercise has become a fundamental aspect of women's lives and an important constituent of antenatal care. The reviewed studies suggest that yoga can maintain cardiac autonomic regulation. Yoga practices, yoga postures, appear to improve autonomic regulation and enhance vagal dominance, and regulates heart rate. Regular physical activity in all phases of life, including

pregnancy, promotes health benefits. Pregnancy is an ideal time for maintaining and adopting a healthy lifestyle. Blood vessels are of a certain caliber, and may constrict for a long period of time, thus causing the blood to flow through them under increased tension giving rise to an entity called 'Hypertension'. The current belief is change in lifestyle and attitudes-in the direction of a spiritual life-is a happy one. Yoga and exercise regulates blood pressure among antenatal mothers.

**Practicing meditation or yoga may help to lower the heart rate.** Many lifestyle habits can contribute to lower the resting heart rate in the long term. They may also improve a person's ability to maintain a healthy heart rate during physical activity and stress. Exercise is the easiest and most effective way to achieve a lasting lower heart rate. Further, the physiological effects of yoga, decreases heart rate and blood pressure and the physical effects helps in weight loss and increases muscle strength. Finally, potential underlying mechanisms are proposed including the stimulation of pressure receptors leading to enhanced vagal activity and reduced cortisol. The reduction in cortisol, in turn, may contribute to positive effects such as enhanced immune function and a lower prematurity rate. When it comes to labor and delivery, usually the most anxiety-provoking aspects of pregnancy, many women spend weeks, if not months, fretting over whether they'll be able to deliver the baby. But women who develop a prenatal yoga practice before giving birth may learn how to minimize anxiety over labor. "Yoga practice encourages a deep, intimate connection between the mom and baby, and it empowers a woman to trust to have normal delivery.

## MATERIALS AND METHODS

A comparative quantitative evaluation approach was used in the study to assess the effectiveness of antenatal exercises and yoga on biophysiological parameters like temperature, pulse, respiration and blood pressure among antenatal women. In order to accomplish the objectives of the study true experimental pre-test, post-test and control group design was adopted in the present study. The study was approved by Institutional Human Ethics Committee of Sri Venkateswara Medical College and Hospital, Tirupati. (Approval No: 001/SRC/2018 and dated 16/06/2018, L.r.04/2018).

**Participants:** Antenatal second gravid women were selected as study sample by random technique based on the inclusion and exclusion criteria. The estimated sample size was 200 for four groups the size was 100 (for two groups of control) and 100 (for two groups of experimental), with the total sample size of 200. The age groups of control and experimental was divided after the completion of the study.

**Inclusion and exclusion criteria:** The study included second trimester mothers who gave informed consent to participate in the study. The study excluded second trimester mothers suffering from heart disease, incompetent cervix and any other medical and obstetrical illnesses and complications.

**Data collection procedure:** The importance of the study was explained and discussed with the superintendent of Govt Maternity Hospital, Tirupati and obtained permission to conduct study in the antenatal out patient department.

Antenatal mothers with completion of 16 weeks i.e. who are in second trimester and who are in Tirupati surroundings up to 10 kms were enrolled to the study based on inclusion criteria. Total sample divided into four groups. 100 for two groups of control and 100 for two groups of experimental. Permission was obtained from Maternity Hospital superintendant for arrangement of hall for intervention. First Tuesday experimental group was called and assembled in the hall. Written consent obtained from each sample. Physical examination done with thorough health history, In practical session biophysiological parameters were measured for each woman before and after the antenatal exercises and yogasanas. Every Tuesday up to delivery (follow up sessions) mothers were advised to attend for practical session. If mothers are unable to come to O.P the investigator contacted mothers directly. Once in two days mothers were communicated on phone call. Participants satisfaction regarding these exercises and yogasanas was measured with comfort and biophysiological parameters. Every Wednesday up to delivery control group mothers were called and assembled in a hall and written consent was obtained to participate in study. In practical session biophysiological parameters were measured for each woman without intervention Complete medical and physical examination was done for control group. After completion of sessions all the cases in experimental and control group assessed for comfort of mothers and for biophysiological parameters to estimate study effectiveness.

## RESULTS AND DISCUSSION

The data were analyzed by means of descriptive and inferential statistics. Frequency and percentage distribution was used to describe demographic variables. The biophysiological parameters were expressed as Mean, SE analyzed by one way ANOVA with Student Newman Keul's multiple comparison test. The respective pre-test and post-test between control and experimental groups were compared by paired Student 't' test. A probability of 0.01 was taken as statistically significant. The analysis and plotting of graphs were carried out using Sigma Plot 13 (SystatSoft ware Inc., USA).

**Biophysiological parameters:** Table-I Shows the comparison of biophysiological parameter like temperature related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test. The temperature mean and standard error of control group primi and multi pre and post test are 98.48, 98.45, 98.61 and 98.60. SE includes 0.048, 0.051, 0.042 and 0.042 respectively. The mean and standard error of experimental group primi and multi pre and post test are 98.29, 98.29, 98.19 and 98.21. SE includes 0.042, 0.041, 0.026 and 0.029. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.511 and <0.015, C-Pre-Multi and C-Post-Multi are 2.318 and <0.025 E-Pre-Pri and E-Post-Pri are 2.045 and <0.046 which were significant at 1% level and E-Pre-Multi and E-Post-Multi are 1.556 and p=0.126 respectively, which was not significant. It was noted that all groups were significantly differ with each other except experimental pre multi and post multi.

**Pulse rate:** Comparison of pulse rate related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test.

**Table 1. Comparison of biophysiological parameters related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test n=50**

S.no	Parameter	Group	Test	Mean	SEM	Paired t- test
1.	Temperature	Control-Primi	Pre	98.480	0.0485	t=2.511
			Post	98.612	0.0429	p=0.015
		Control-Multi	Pre	98.456	0.0511	t=2.318
			Post	98.604	0.0459	p=0.025
		Experimental-Primi	Pre	98.296	0.0421	t=2.045
			Post	98.196	0.0265	p=0.046
Experimental-Multi	Pre	98.296	0.0417	t=1.556		
	Post	98.216	0.0290	p=0.126		
2.	Pulse rate	Control-Primi	Pre	75.560	0.440	t=3.642
			Post	78.520	0.668	p=0.001
		Control-Multi	Pre	75.200	0.461	t=1.902
			Post	76.840	0.637	p=0.063
		Experimental-Primi	Pre	73.080	0.380	t=2.856
			Post	71.720	0.333	p=0.006
Experimental-Multi	Pre	73.400	0.376	t=2.182		
	Post	72.160	0.347	p=0.034		
3.	Respiratory rate	Control-Primi	Pre	20.080	0.255	t=2.378
			Post	21.280	0.374	p=0.021
		Control-Multi	Pre	19.960	0.271	t=1.406
			Post	20.600	0.380	p=0.166
		Experimental-Primi	Pre	20.040	0.265	t=3.066
			Post	19.000	0.287	p=0.004
Experimental-Multi	Pre	20.000	0.262	t=2.271		
	Post	19.200	0.268	p=0.028		

**Table 2. Comparison of blood pressure related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test**

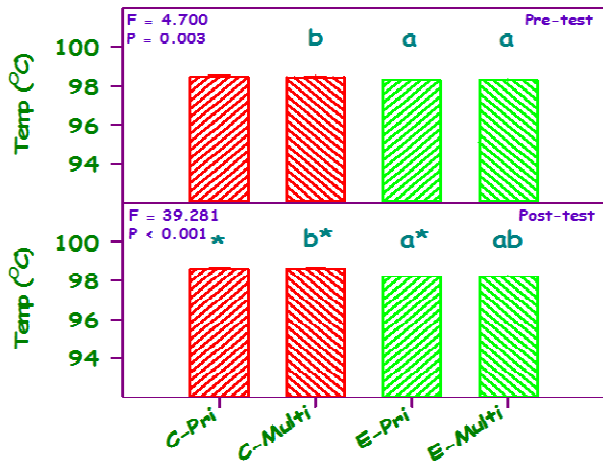
S.no	Parameter	Group	Test	Mean	SEM	Paired t- test
1.	SBP	Control-Primi	Pre	116.000	0.0883	t=2.133
			Post	118.840	0.955	p=0.038
		Control-Multi	Pre	115.400	0.925	t=2.551
			Post	118.720	0.944	p=0.014
		Experimental-Primi	Pre	116.480	0.757	t=3.128
			Post	113.200	0.978	p=0.003
Experimental-Multi	Pre	116.040	0.825	t=3.319		
	Post	111.480	1.103	p=0.002		
2.	DBP	Control-Primi	Pre	76.160	0.661	t=0.929
			Post	76.880	0.580	p=0.353
		Control-Multi	Pre	76.040	0.645	t=0.256
			Post	76.240	0.601	p=0.799
		Experimental-Primi	Pre	74.400	0.428	t=3.908
			Post	72.160	0.356	p=0.001
Experimental-Multi	Pre	74.440	0.405	t=4.307		
	Post	72.000	0.370	p=0.001		

The mean and standard error of control group primi and multi pre and post test are 75.56, 75.20, 78.52 and 76.84. SE includes 0.44, 0.46, 0.66 and 0.63. The mean and standard error of experimental group primi and multi pre and post test are 73.08, 73.40, 71.72 and 72.16. SE includes 0.38, 0.37, 0.33 and 0.34. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 3.642 and <0.001 which was significant at 1% level, C-Pre-Multi and C-Post-Multi are 1.902 and p=0.063 which was not significant. E-Pre-Pri and E-Post-Pri are 2.856 and <0.006 and E-Pre-Multi and E-Post-Multi are 2.182 and <0.034 respectively. Both were significant at 1% level. It was noted that all groups were significantly differ with each other except control pre multi and post multi.

**Respiration rate:** Comparison of respiration rate related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test. Related to respiration rate the mean and standard error of control group primi and multi pre and post test are 20.08, 19.96, 21.28 and 20.60.

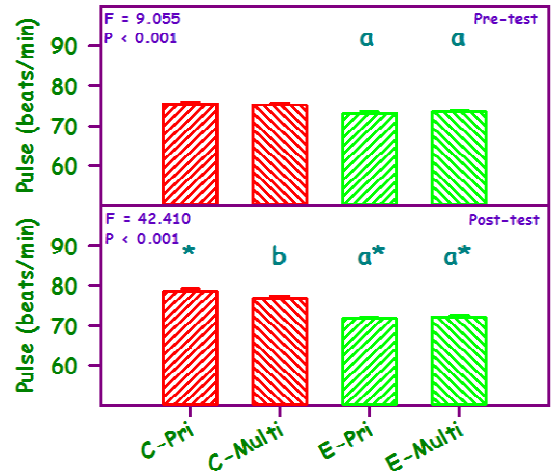
SE includes 0.25, 0.27, 0.37 and 0.38. The mean and standard error of experimental group primi and multi pre and post test are 20.04, 20.00, 19.00 and 19.20. SE includes 0.26, 0.26, 0.28 and 0.26. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.378 and <0.021 which was significant at 1% level, C-Pre-Multi and C-Post-Multi are 1.406 and p=0.166 which was not significant. E-Pre-Pri and E-Post-Pri are 3.066 and <0.004 and E-Pre-Multi and E-Post-Multi are 2.271 and <0.028 respectively. Both were significant at 1% level. It was noted that all groups were significantly differ with each other except control pre multi and post multi.

**Systolic blood pressure:** Table -2 shows the comparison of biophysiological parameter like systolic blood pressure related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test. The systolic blood pressure mean and standard error of control group primi and multi pre and post test are 116.00, 115.40, 118.84 and 118.72. SE includes 0.88, 0.92, 0.95 and 0.94.



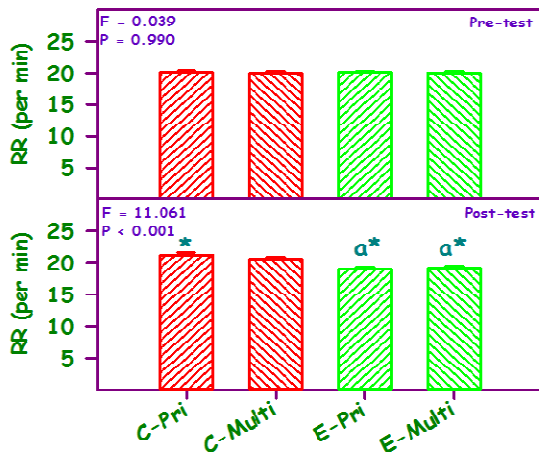
Values are mean + SE (n = 50 each)  
 The 'F' and 'P' values are by one way ANOVA with Student Newman Keul's multiple comparison test.  
<sup>a</sup>Significantly different from the primigravid of control and experimental groups; or multigravid of control and experimental groups  
<sup>b</sup>Significantly different from the primigravid and multigravid of control; or primigravid and multigravid of experimental groups.  
 The respective pre-test and post-test are compared by paired Student 't' test.  
 The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.511 and 0.015 respectively.  
 The 't' and 'P' values for C-Pre-Multi and C-Post-Multi are 2.318 and 0.025 respectively.  
 The 't' and 'P' values for E-Pre-Pri and E-Post-Pri are 2.045 and 0.046 respectively.  
 The 't' and 'P' values for E-Pre-Multi and E-Post-Multi are 1.556 and 0.126 respectively.  
 \*Significantly different from the respective pre-test and post-test of control and experimental groups.

**Figure 1. Effect of antenatal exercises with yoga on temperature of control (C) and experimental (E) groups of primigravid (Pri) and multigravid (Multi) women**



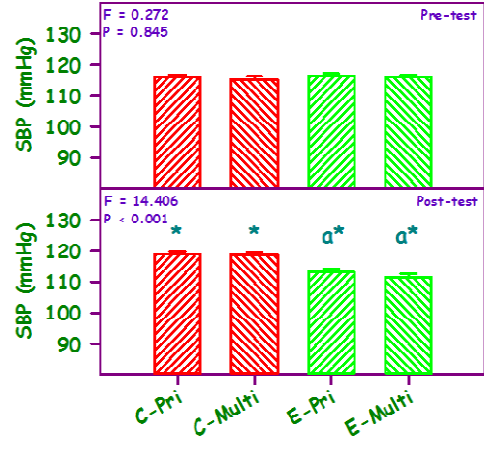
Values are mean + SE (n = 50 each)  
 The 'F' and 'P' values are by one way ANOVA with Student Newman Keul's multiple comparison test.  
<sup>a</sup>Significantly different from the primigravid of control and experimental groups; or multigravid of control and experimental groups  
<sup>b</sup>Significantly different from the primigravid and multigravid of control; or primigravid and multigravid of experimental groups.  
 The respective pre-test and post-test are compared by paired Student 't' test.  
 The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 3.642 and < 0.001 respectively.  
 The 't' and 'P' values for C-Pre-Multi and C-Post-Multi are 1.902 and 0.063 respectively.  
 The 't' and 'P' values for E-Pre-Pri and E-Post-Pri are 2.856 and 0.006 respectively.  
 The 't' and 'P' values for E-Pre-Multi and E-Post-Multi are 2.182 and 0.034 respectively.  
 \*Significantly different from the respective pre-test and post-test of control and experimental groups.

**Figure 2. Effect of antenatal exercises with yoga, on pulse rate of control (C) and experimental (E) groups of primigravid (Pri) and multigravid (Multi) women**



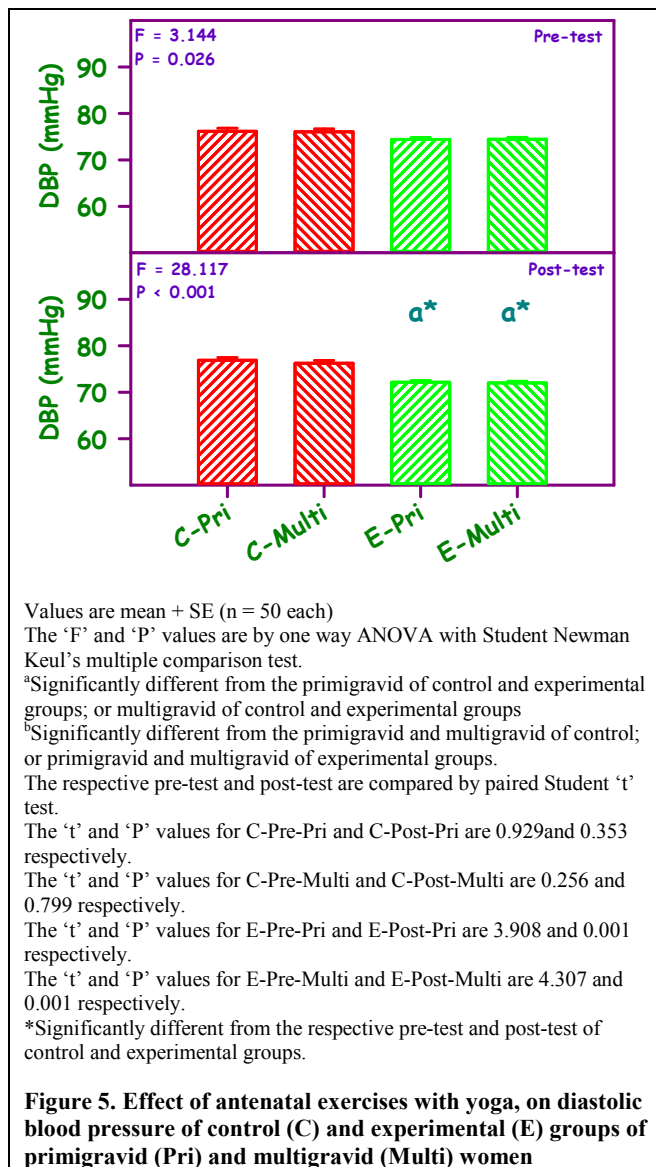
Values are mean + SE (n = 50 each)  
 The 'F' and 'P' values are by one way ANOVA with Student Newman Keul's multiple comparison test.  
<sup>a</sup>Significantly different from the primigravid of control and experimental groups; or multigravid of control and experimental groups  
<sup>b</sup>Significantly different from the primigravid and multigravid of control; or primigravid and multigravid of experimental groups.  
 The respective pre-test and post-test are compared by paired Student 't' test.  
 The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.378 and 0.021 respectively.  
 The 't' and 'P' values for C-Pre-Multi and C-Post-Multi are 1.406 and 0.166 respectively.  
 The 't' and 'P' values for E-Pre-Pri and E-Post-Pri are 3.066 and 0.004 respectively.  
 The 't' and 'P' values for E-Pre-Multi and E-Post-Multi are 2.271 and 0.028 respectively.  
 \*Significantly different from the respective pre-test and post-test of control and experimental groups.

**Figure 3. Effect of antenatal exercises with yoga, on respiration rate of control (C) and experimental (E) groups of primigravid (Pri) and multigravid (Multi) women**



Values are mean + SE (n = 50 each)  
 The 'F' and 'P' values are by one way ANOVA with Student Newman Keul's multiple comparison test.  
<sup>a</sup>Significantly different from the primigravid of control and experimental groups; or multigravid of control and experimental groups  
<sup>b</sup>Significantly different from the primigravid and multigravid of control; or primigravid and multigravid of experimental groups.  
 The respective pre-test and post-test are compared by paired Student 't' test.  
 The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.133 and 0.038 respectively.  
 The 't' and 'P' values for C-Pre-Multi and C-Post-Multi are 2.551 and 0.014 respectively.  
 The 't' and 'P' values for E-Pre-Pri and E-Post-Pri are 3.128 and 0.003 respectively.  
 The 't' and 'P' values for E-Pre-Multi and E-Post-Multi are 3.319 and 0.002 respectively.  
 \*Significantly different from the respective pre-test and post-test of control and experimental groups.

**Figure 4. Effect of antenatal exercises with yoga, on systolic blood pressure of control (C) and experimental (E) groups of primigravid (Pri) and multigravid (Multi) women**



The mean and standard error of experimental group primi and multi pre and post test are 116.48, 116.04, 113.20 and 111.48. SE includes 0.75, 0.82, 0.97 and 1.10. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 2.133 and <0.038, C-Pre-Multi and C-Post-Multi are 2.551 and  $p=0.014$ . E-Pre-Pri and E-Post-Pri are 3.128 and <0.003 and E-Pre-Multi and E-Post-Multi are 3.319 and <0.002 respectively. All are significant at 1% level. It was noted that all groups were significantly differ with each other.

**Diastolic blood pressure:** Comparison of diastolic blood pressure related to antenatal exercises with yoga between control and experimental group of primi and multi gravid mothers in pre and post test. The diastolic blood pressure mean and standard error of control group primi and multi pre and post test are 76.16, 76.04, 76.88 and 76.24. SE includes 0.66, 0.64, 0.58 and 0.60. The mean and standard error of experimental group primi and multi pre and post test are 74.40, 74.44, 72.16 and 72.00. SE includes 0.42, 0.40, 0.35 and 0.37. The 't' and 'P' values for C-Pre-Pri and C-Post-Pri are 0.929 and  $p=0.353$ , C-Pre-Multi and C-Post-Multi are 0.256 and  $p=0.799$ . Both are not significant. E-Pre-Pri and E-Post-Pri are 3.908 and <0.001 and E-Pre-Multi and E-Post-Multi are 4.307 and <0.001 respectively. Both are significant at 1% level.

It was noted that groups were significantly differ with each other. The test of significance (difference in proportions) showed the difference was statistically significant and hence it was concluded that there was a strong evidence of a difference in biophysiological parameters of control and experimental groups of primi and multi gravid mothers. Results of the study revealed that for all parameters the obtained P value was  $P=<0.001$ . It shows that antenatal exercises with yoga was very effective intervention to maintain stable biophysiological parameters among antenatal mothers.

## DISCUSSION

Recent advancements in Obstetric and gynecology have minimized the risks during pregnancy and labor. However especially primi gravid women have stress and anxiety related to their delivery process. The current study revealed that regular practice of antenatal exercises with yoga in second and third trimester of pregnancy resulted in slight decrease of all biophysiological parameters among antenatal mothers. Through out pregnancy experimental group mothers were stable with their parameters and experimental group mothers felt more comfort and experienced with less labor pain during labor. The present study findings showed that there was significant difference in groups with each other. Related to temperature in post test in experimental group marginal decrease of 0.1  $F^0$  was noted. pulse rate : in experimental group in post test 1-2 beats decrease was observed. In respiration 1 cycle per minute decrease was observed in experimental post test group. With systolic blood pressure 3 -5 mm of Hg decrease was noted in experimental post test group. Related to diastolic blood pressure 2mm of Hg decrease was observed in experimental post test group. All these parameters were significant at 1% level. The study findings concluded that antenatal exercises and yoga were very effective interventions in maintaining biophysiological parameters. In experimental group it was noticed that slight decrease in all biophysiological parameters and increased comfort to the mothers.

## Conclusion

The study concluded that antenatal exercises and yoga were very effective interventions in maintaining biophysiological parameters. In experimental group it was noticed that slight decrease in all biophysiological parameters and increased comfort to the mothers. Through out the study experimental group mothers parameters were stable, felt comfort during labor compared to control group mothers. Slight decrease in parameters decreased the risk of pre-eclampsia, over weight and diabetes among antenatal mothers. Most of the parameters are significant at 1% level. It showed that antenatal exercise with yoga are very effective interventions.

## Recommendations

- A similar study can be carried out in other areas than Tirupati.
- A similar study can be carried out with different parameters like different yogasanas and other exercises.
- A similar study can be carried out with large sample size.

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