CHAPTER - IV

ANALYSIS OF DATA AND RESULTS OF THE STUDY

In this chapter, the data collected from the subjects was graded and compared with the acceptable limit to reveal the purpose of the study. They do not serve the purpose unless and otherwise they were carefully processed, systematically arranged, scientifically calculated and analyzed, brilliantly interpreted and rationally concluded.

In this study, the Effect of selected Yogic Practice and PNF (Proprioceptive neuromuscular facilitation) stretching exercises on back pain, blood pressure, stress and health related physical fitness components were investigated. The data collected from the subjects have been processed and critically analyzed to get exact conclusions. The results and discussions on findings of treatment effects individually and comparatively on variables used in the present study are presented in this chapter.

4.1 ANALYSIS OF DATA

The influence of independent variables on the selected criterion was determined by subjecting the collected data to the analysis of variance and covariance as well as with the help of raw scores.

4.2 LEVEL OF SIGNIFICANCE

To test the obtained results on variables, level of significance 0.05 was chosen and considered as sufficient for the present study.

4.3 RESULTS OF TREATMENT EFFECTS

The statistical analysis of significance of the mean gains or losses made in the scores in the criterion measures are presented in tables 4.1 to 4.3

Table 4.1

Significance Of Mean Gains / Losses Between Pre And Post Test Of Yogic Practice Group On Back Pain, Blood Pressure, Stress And Health Related Physical Fitness Variables among Women

Variables		**Pre-test Mean ± SD**	**Post-test Mean ± SD**	**Difference**	**Standard Error**	**'t'-ratio**
Back pain (Numbers)		9.40 ± 1.99	5.10 ± 2.64	4.30	0.38	11.19*
Systolic Blood Pressure (mmHg)		164.33 ± 18.51	122.66 ± 4.49	41.66	3.35	12.40*
Diastolic Blood Pressure (mmHg)		102.33 ± 9.25	92.23 ± 9.47	10.10	1.44	6.97*
Stress (Numbers)		181.66 ±13.66	123.46 ± 15.58	58.20	3.43	16.94*
Health Related Physical Fitness Components	Muscular Strength and Endurance (Numbers)	13.43 ±5.82	15.96 ± 5.39	2.53	0.36	6.95*
	Flexibility (Centimeters)	19.43 ± 6.83	21.43 ± 6.99	2.00	0.29	6.67*
	Cardio Vascular Endurance (Meters)	1894.00	2046.67	152.67	.038	6.13*

***Significant at 0.05 level: 2.04**

Table 4.1 indicates that the obtained 't' values of Yogic Practice Group (YG) on variables are: 11.19 (Back pain), 12.40 (systolic blood pressure), 6.97 (diastolic blood pressure), 16.94 (stress), 6.95 (muscular strength and endurance), 6.67 (flexibility), 6.13 (cardio vascular endurance). The obtained t- values are significant at 0.05 levels for degree of freedom 1, 14 positively as they exceed the required critical value of 2.04. Hence the obtained t-values on the selected variables are higher than the required critical value, it is concluded that the Yogic Practice Group, has produced significant changes positively from its baseline to post treatment on back pain (11.19, $P < 0.05$, 46%), systolic blood pressure (12.40, $P < 0.05$, 25%), diastolic blood pressure (6.97, $P < 0.05$, 10%), stress(16.94, $P < 0.05$, 32%), muscular strength and endurance (6.95, $P < 0.05$, 19%), flexibility (6.67, $P < 0.05$, 10%), cardio vascular endurance (6.13, $P < 0.05$, 6 %). The changes observed from baseline to post treatment after twelve weeks on back pain, blood pressure, stress and health related physical fitness components confirms the effect of yogic exercise, that are displayed in figures from 4.1 – 4.7.

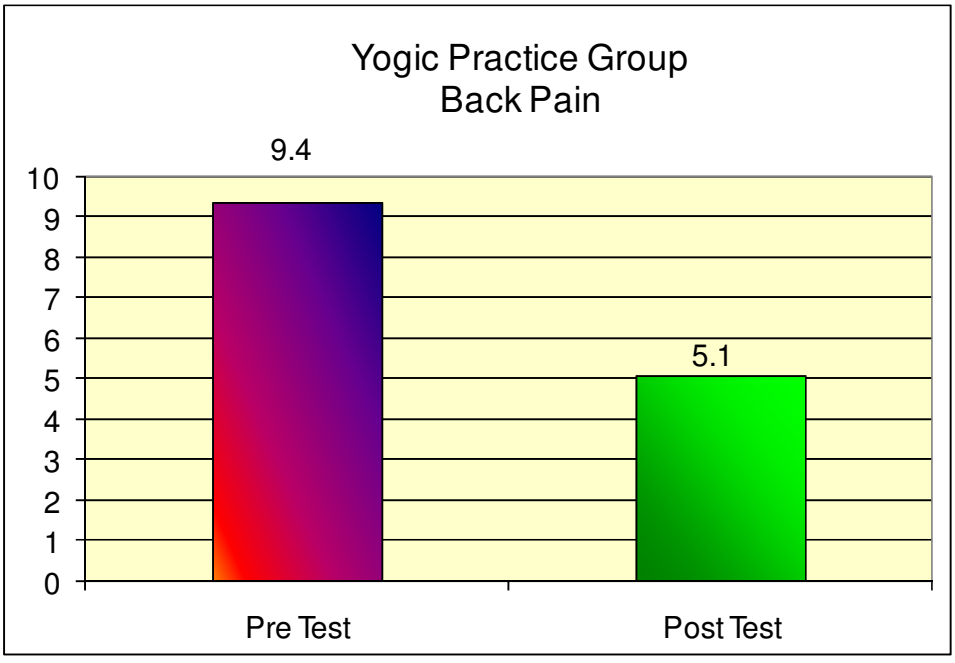

Fig 4.1: The Mean Values of (Pre and Post Test) Yogic Practice Group On Back Pain

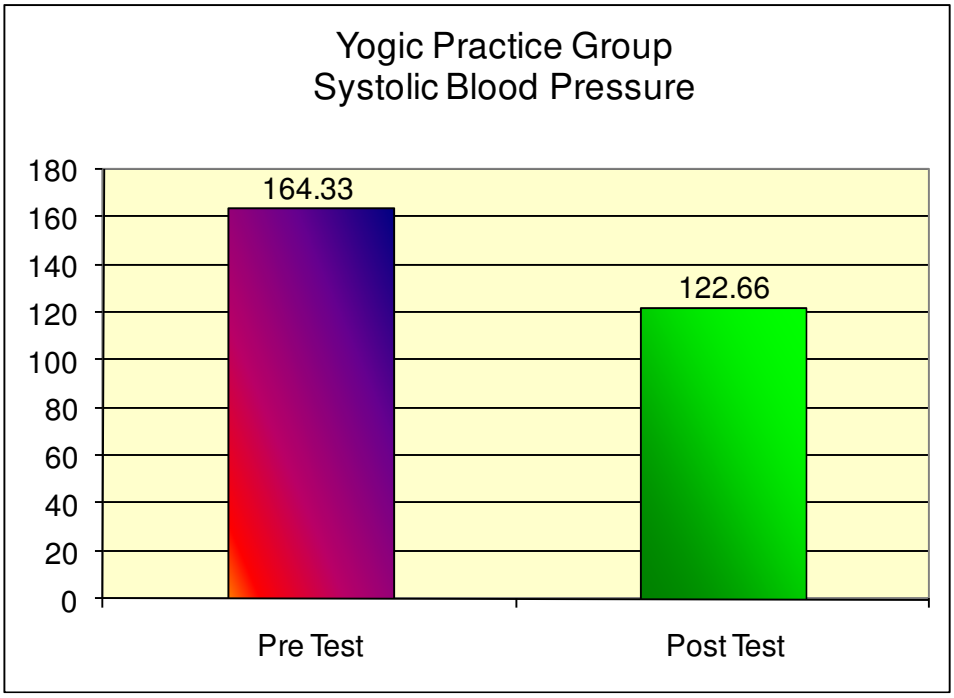

Fig 4.2: The Mean Values of (Pre and Post Test) Yogic Practice Group On Systolic Blood Pressure

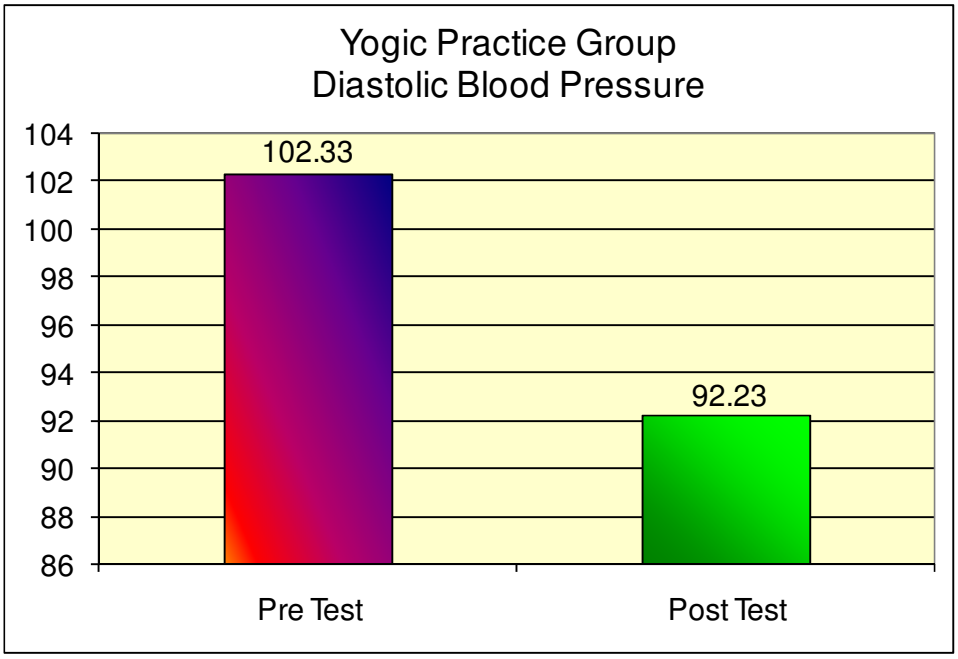

Fig 4.3: The Mean Values of (Pre and Post Test) Yogic Practice Group On Diastolic Blood Pressure

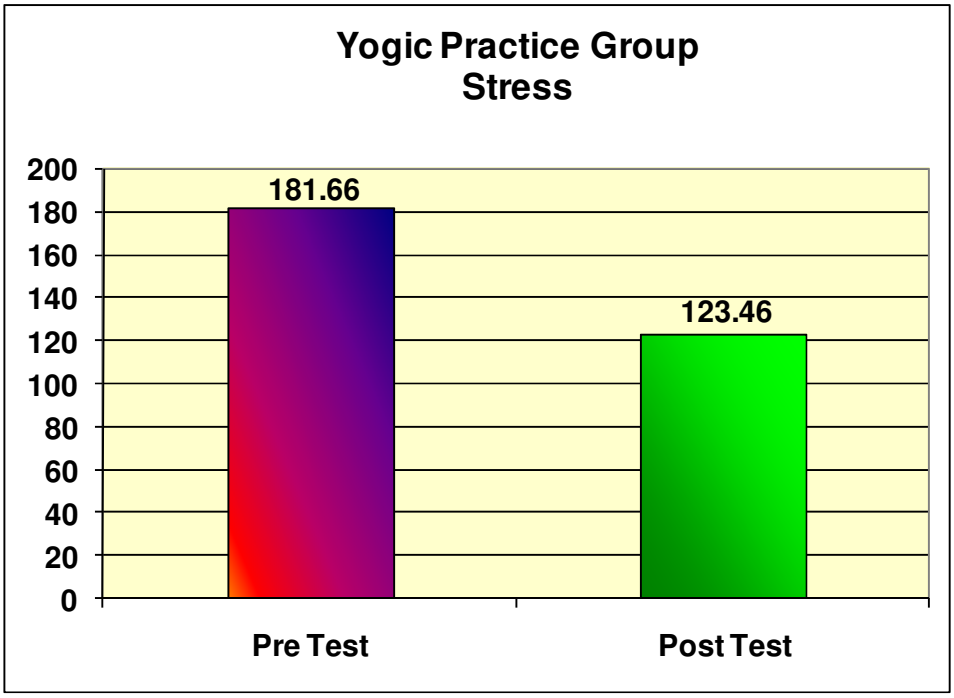

Fig 4.4: The Mean Values of (Pre and Post Test) Yogic Practice Group On Stress

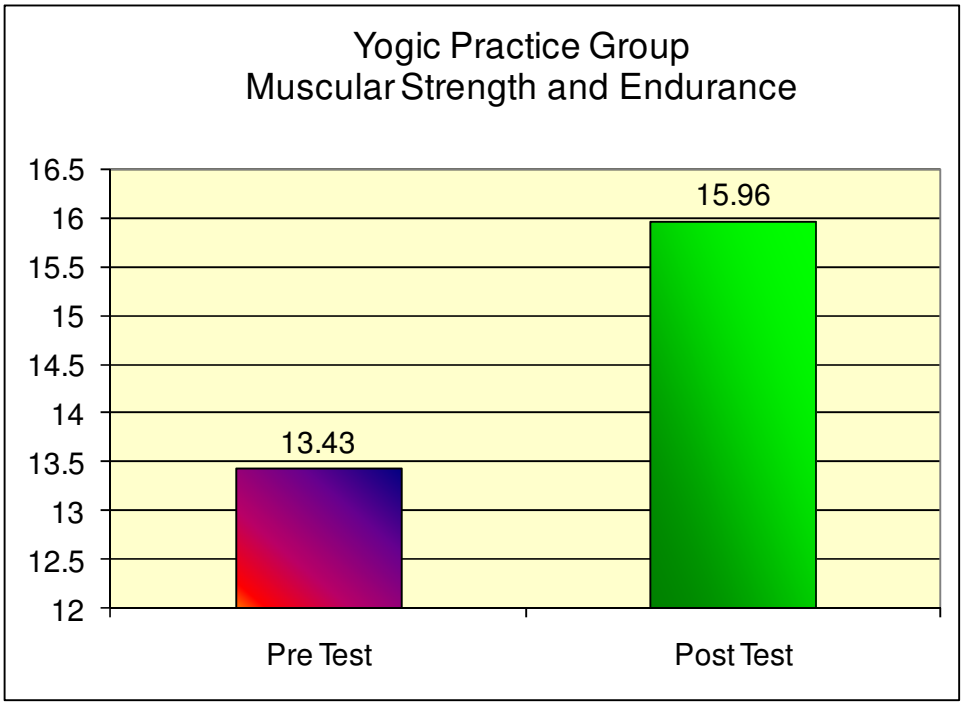

Fig 4.5: The Mean Values of (Pre and Post Test) Yogic Practice Group On Muscular Strength and Endurance

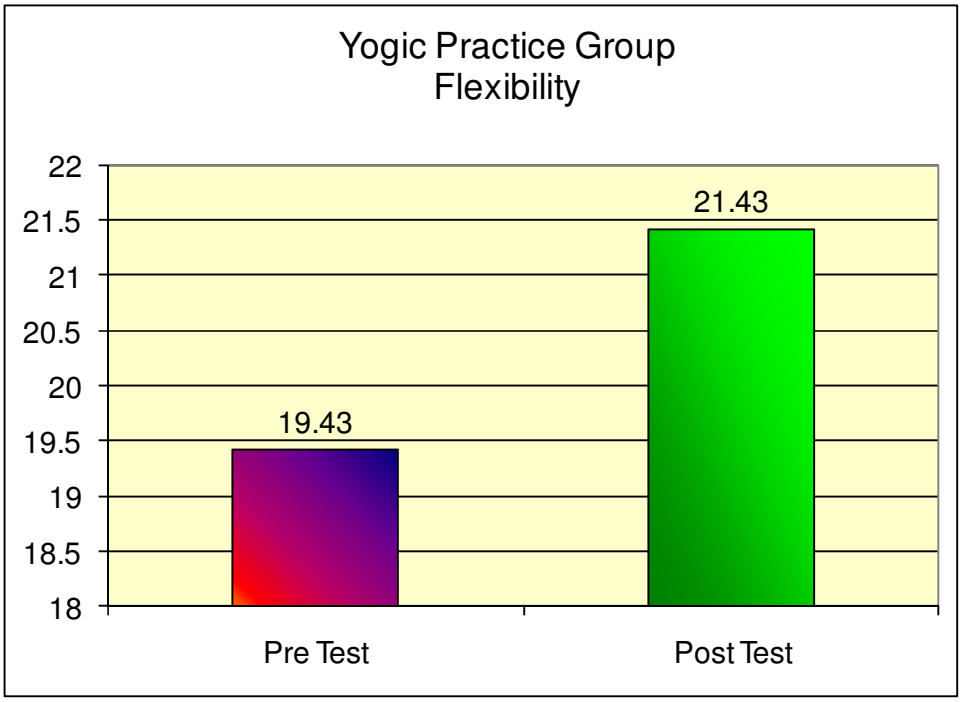

Fig 4.6: The Mean Values of (Pre and Post Test) Yogic Practice Group On Flexibility

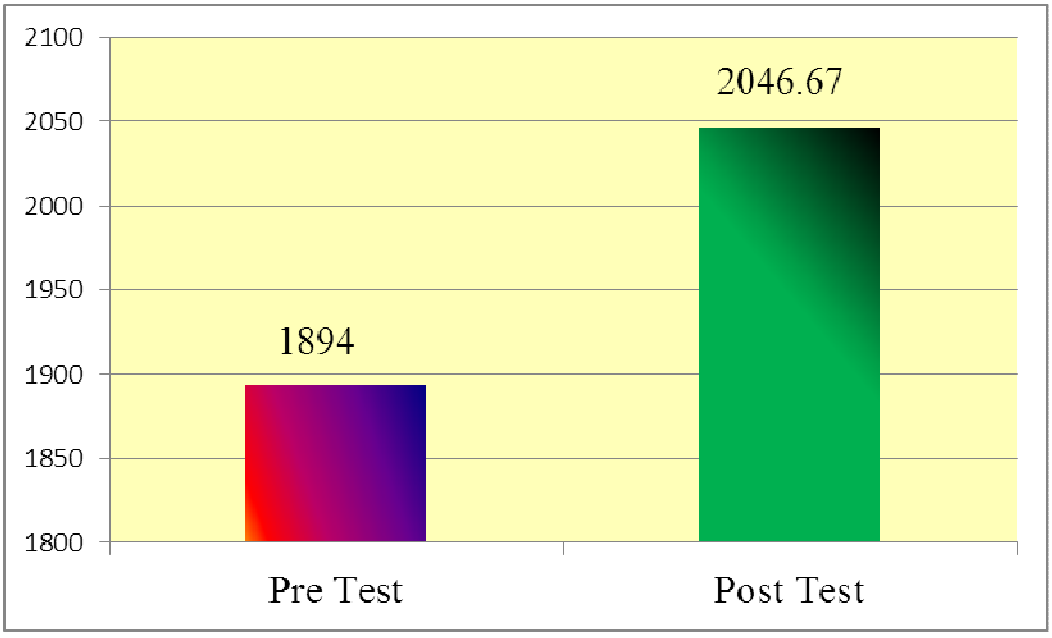

Fig 4.7: The Mean Values of (Pre and Post Test) Yogic Practice Group On Cardio Vascular Endurance

Table 4.2

Significance of Mean Gains / Losses between Pre and Post Test of PNF stretching Exercise Group (Proprioceptive neuromusulcar Facilitation) On Back Pain, Blood Pressure, Stress and Health Related Physical Fitness Variable At Women

Variables		**Pre-test Mean ± SD**	**Post-test Mean ± SD**	**Difference**	**Standard Error**	**'t'-ratio**
Back pain (Numbers)		9.03 ± 2.05	6.20 ± 2.42	2.83	0.31	9.00*
Systolic Blood Pressure (mmHg)		158.33 ± 17.23	130.66 ± 9.07	27.66	2.42	11.38*
Diastolic Blood Pressure (mmHg)		106.33 ± 9.99	89.13 ± 10.14	17.20	2.16	7.95*
Stress (Numbers)		190.96 ±16.02	144.33 ± 28.97	46.63	4.83	9.65*
Health Related Physical Fitness Components	Muscular Strength and Endurance (Numbers)	17.06 ± 9.58	20.10 ± 8.71	3.03	0.34	8.90*
	Flexibility (Centimeters)	18.43 ± 5.19	21.36 ± 5.16	2.93	0.49	5.91*
	Cardio vascular Endurance (Meters)	1891.00	1946.00	55	3.40	8.5*

***Significant at 0.05 level: 2.04**

Table 4.2 indicates that the obtained‘t’ values of PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) on variables are: 9.00 (back pain), 11.38 (systolic blood pressure), 7.95 (diastolic blood pressure), 9.65 (stress), 8.90 (muscular strength and endurance), 5.91 (flexibility), 8.5 (cardio vascular endurance). To be significant at 0.05 level for degree of freedom 1, 14, the required critical value was 2.04. The obtained t-values as it exceeds the required critical value, it is concluded that the PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG), has produced significant changes positively from its baseline to post treatment on back pain (9.00, $P < 0.05$, 31%) , systolic blood pressure (11.38, $P < 0.05$, 17%), diastolic blood pressure (7.95, $P < 0.05$, 16%), stress (9.65, $P < 0.05$, 24%), muscular strength and endurance (8.90, $P < 0.05$, 18%), flexibility (5.91, $P < 0.05$, 16%), cardio vascular endurance (8.5, $P < 0.05$, 9%). The changes observed from baseline to post treatment of after twelve weeks on the variables of above said confirms the significant effect of PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and the same was displayed in figures from 4.8 – 4.14

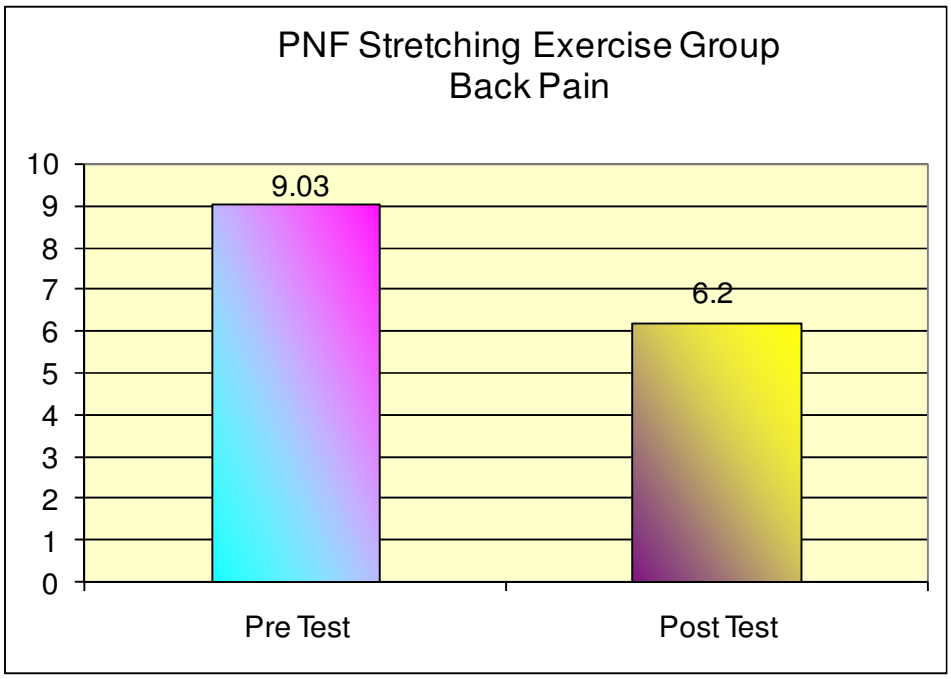

Fig 4.8: The Mean Values of (Pre and Post Test) PNF Proprioceptive neuromuscular facilitation) Stretching Exercise Group On back Pain

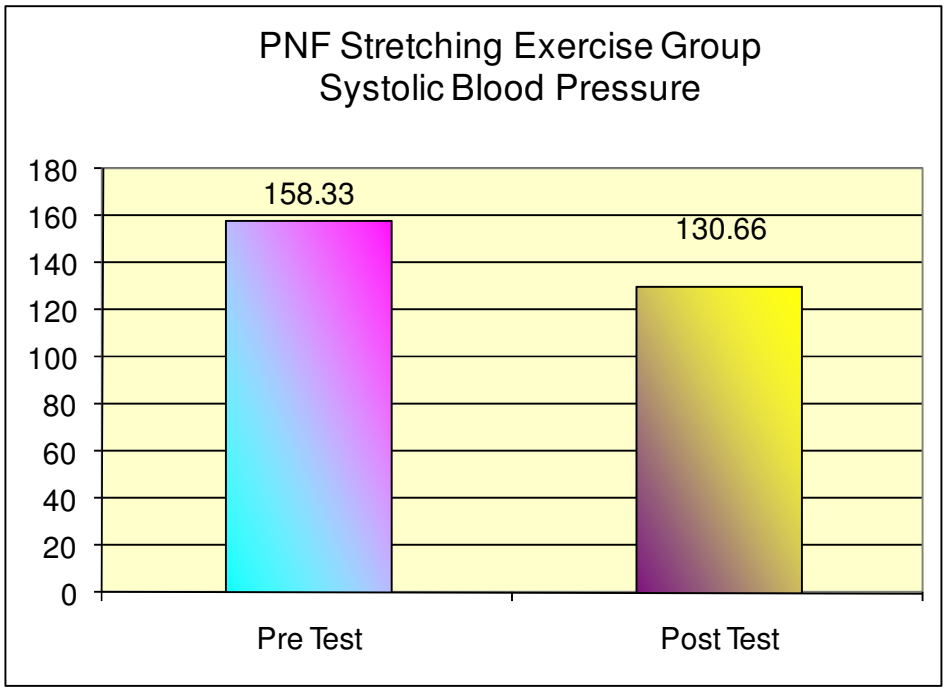

Fig 4.9: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Systolic Blood Pressure

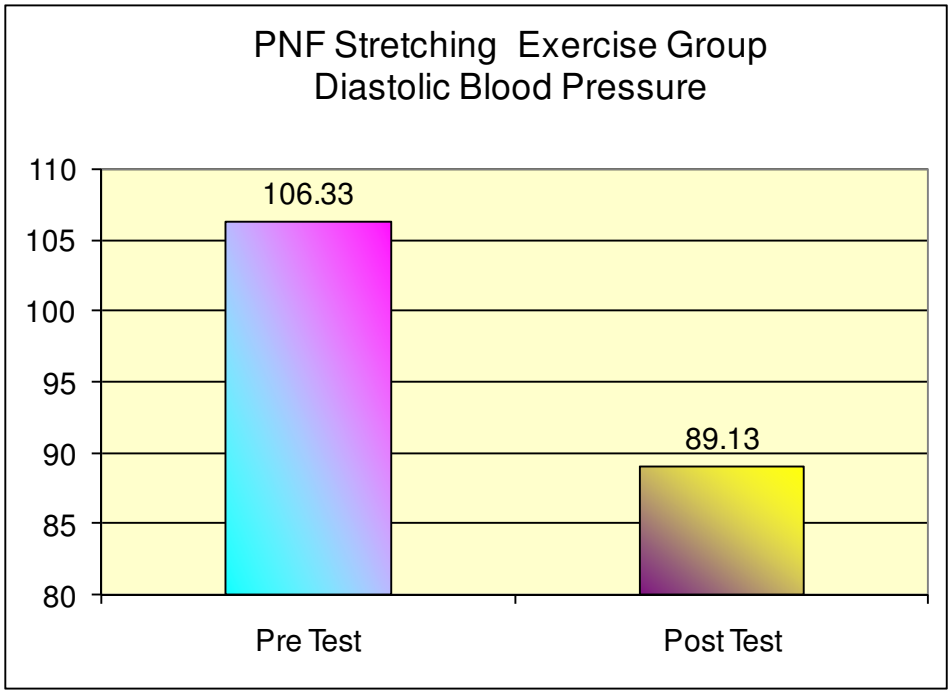

Fig 4.10: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Diastolic Blood Pressure

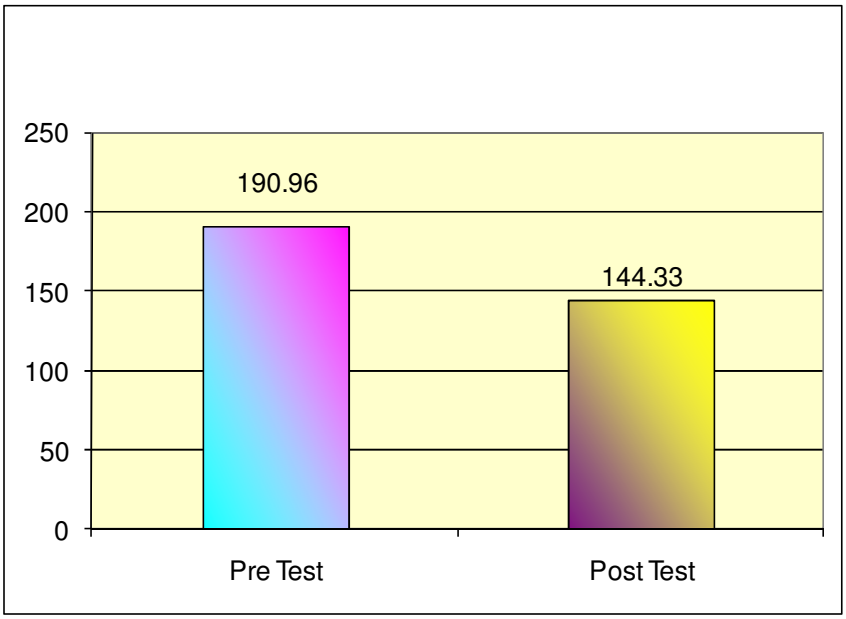

Fig 4.11: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Stress

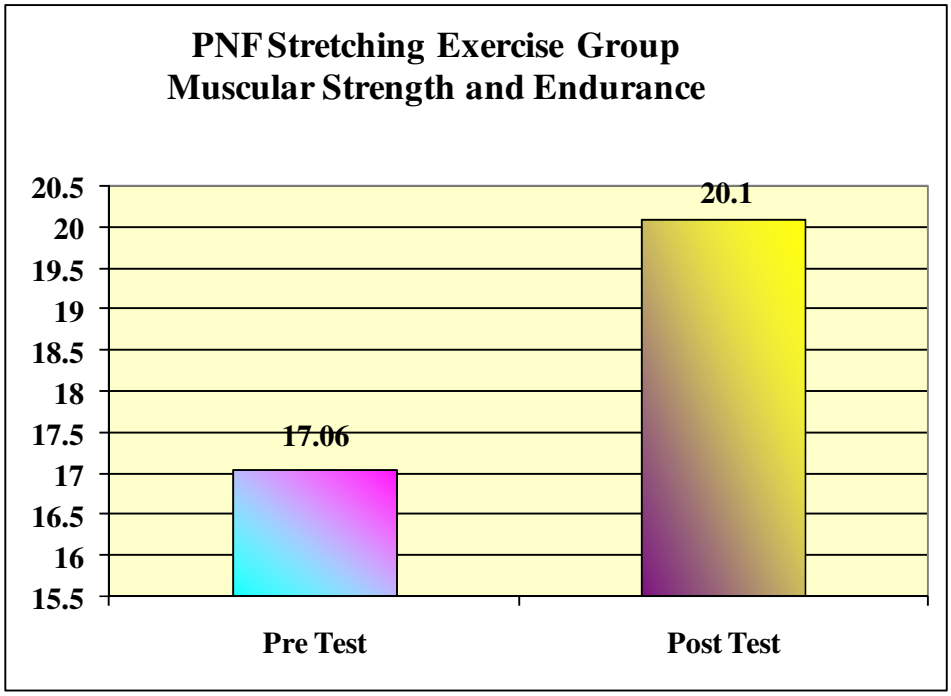

Fig 4.12: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Muscular Strength and Endurance

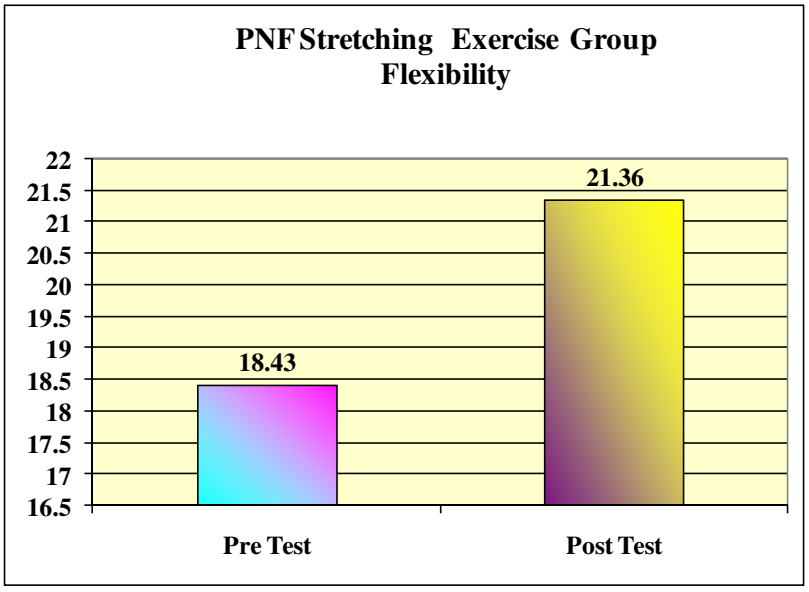

Fig 4.13: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Flexibility

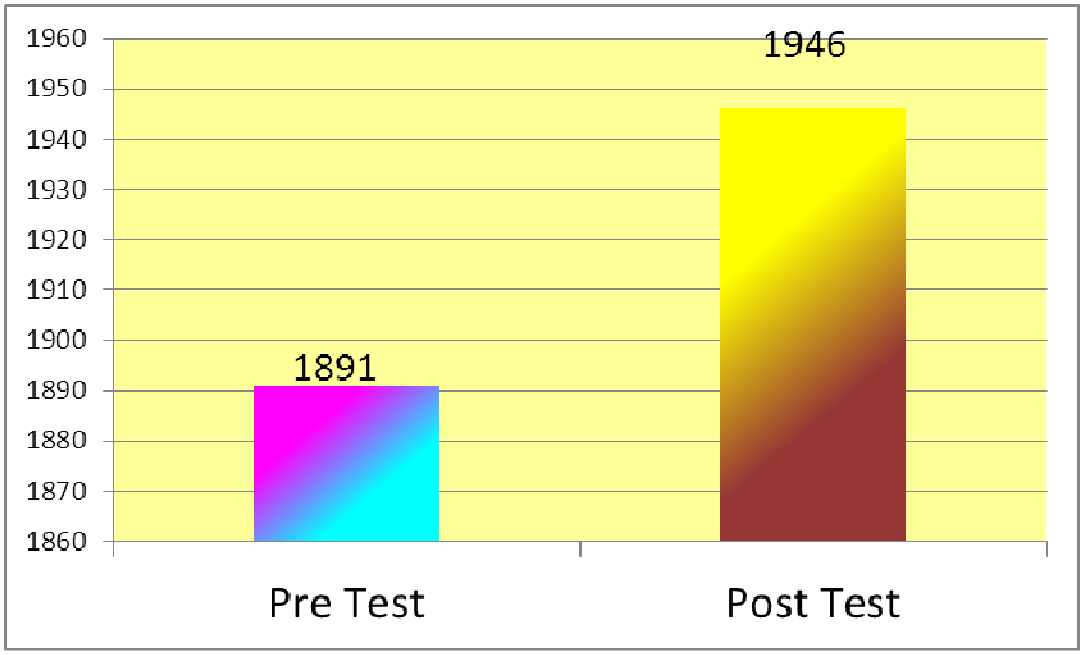

Fig 4.14: The Mean Values of (Pre and Post Test) PNF (Proprioceptive neuromuscular facilitation) Stretching Exercise Group On Cardio Vascular Endurance

Table 4.3

Significance Of Mean Gains / Losses Between Pre And Post Test Of Control Group (CG) On Back Pain, Blood Pressure, Stress And Health Related Physical Fitness Variables among Women

Variables		Pre-test Mean ± SD	Post-test Mean ± SD	Difference	Standard Error	't'-ratio
Back pain (Numbers)		9.70 ± 2.57	9.43 ± 2.38	0.26	0.28	0.94
Systolic Blood Pressure (mmHg)		155.40 ± 19.15	151.73 ± 19.92	3.66	1.83	2.00
Diastolic Blood Pressure (mmHg)		102.83 ± 10.80	103.66 ± 9.59	0.83	0.69	1.20
Stress (Numbers)		191.33 ±31.91	188.33 ± 30.35	3.00	2.52	1.19
Health Related Physical Fitness Components	Muscular Strength and Endurance (Numbers)	14.93 ±6.98	15.26 ±6.97	0.33	0.19	1.67
	Flexibility (Centimeters)	17.16 ± 6.14	17.53 ± 5.59	0.36	0.19	1.88
	Cardio vascular Endurance (Meters)	1891.00	1936.00	45	2.12	1.48

***Significant at 0.05 level: 2.04**

Table 4.3 indicates that the obtained 't' values of the control Group (CG) on variables are: 0.94 (Back pain), 2.00 (systolic blood pressure), 1.20 (diastolic blood pressure), 1.19 (Stress), 1.67 (muscular strength and endurance), 1.88 (flexibility), 55 (cardio vascular endurance). On the above said variables are found to be insignificant at 0.05 level since they failed to reach the required critical value of 2.04 for degree of freedom 1,14. From those it was inferred that the changes made from the baseline to after 12 weeks of treatment period are not statistically significant and the same was displayed in figures from 4.15 – 4.21.

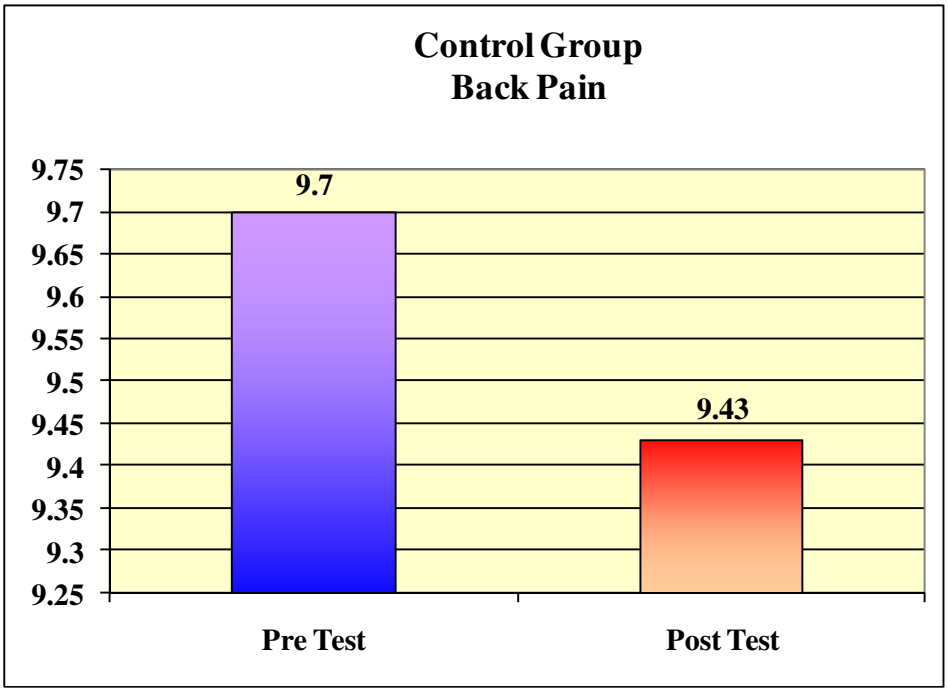

Fig 4.15: The Mean Values of (Pre and Post Test) Control Group On Back Pain

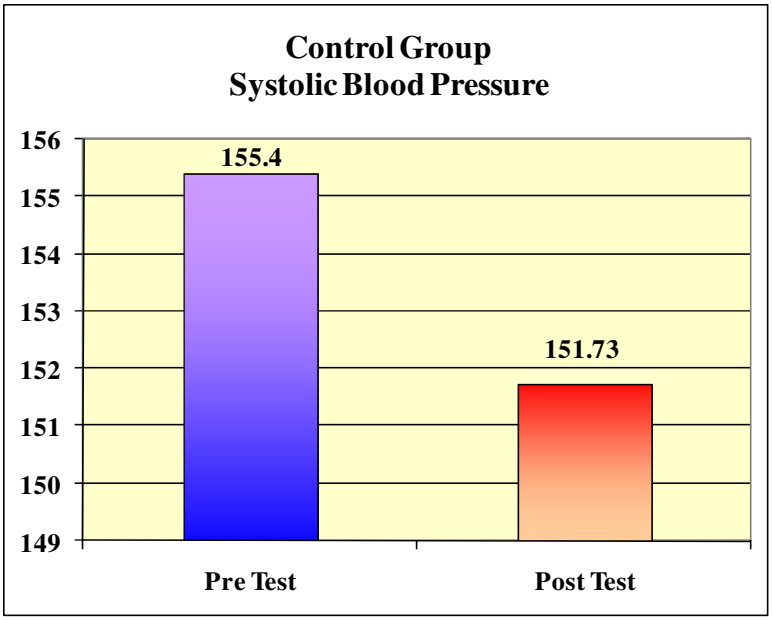

Fig 4.16: The Mean Values of (Pre and Post Test) Control Group On Systolic Blood Pressure

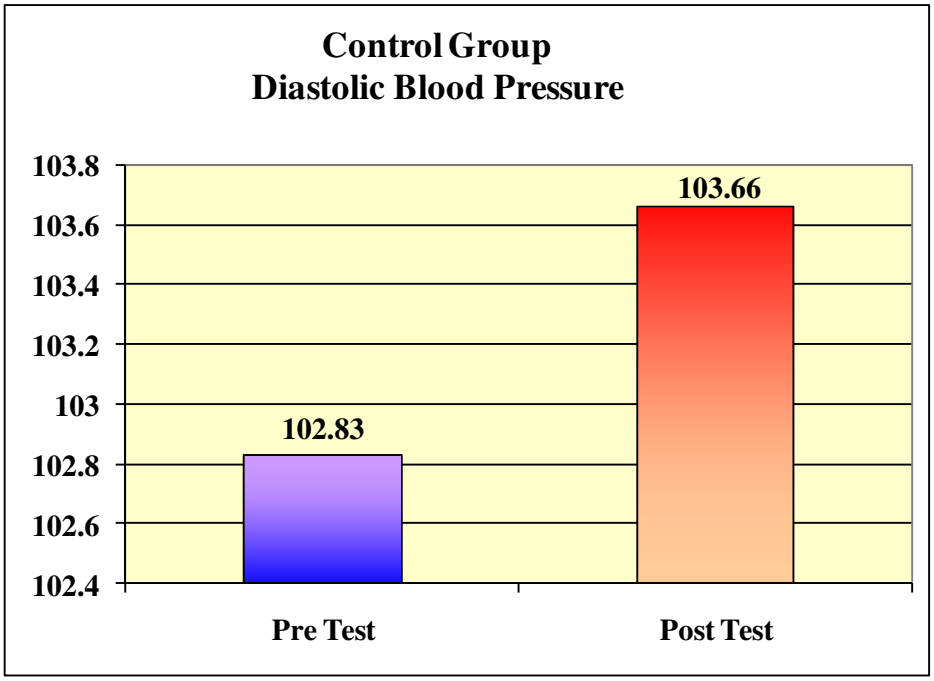

Fig 4.17: The Mean Values of (Pre and Post Test) Control Group On Diastolic Blood Pressure

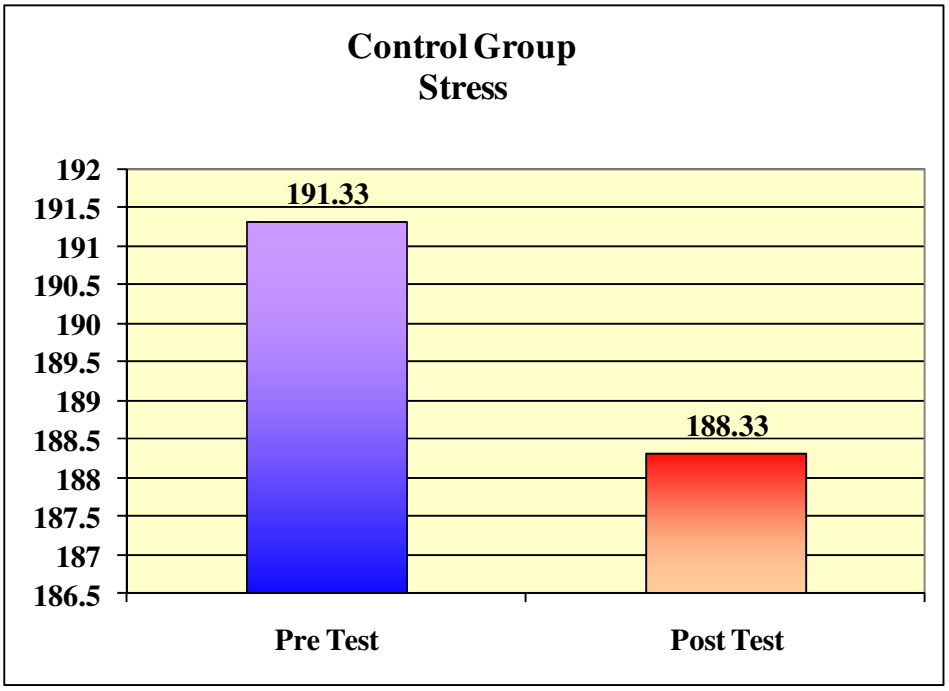

Fig 4.18: The Mean Values of (Pre and Post Test) Control Group On Stress

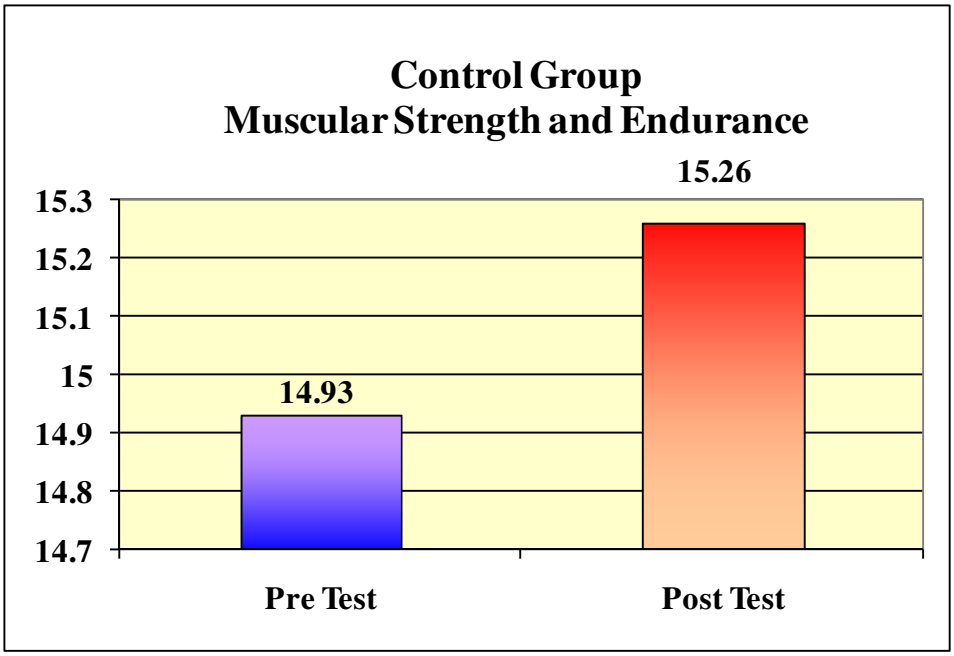

Fig 4.19: The Mean Values of (Pre and Post Test) Control Group On Muscular Strength and Endurance

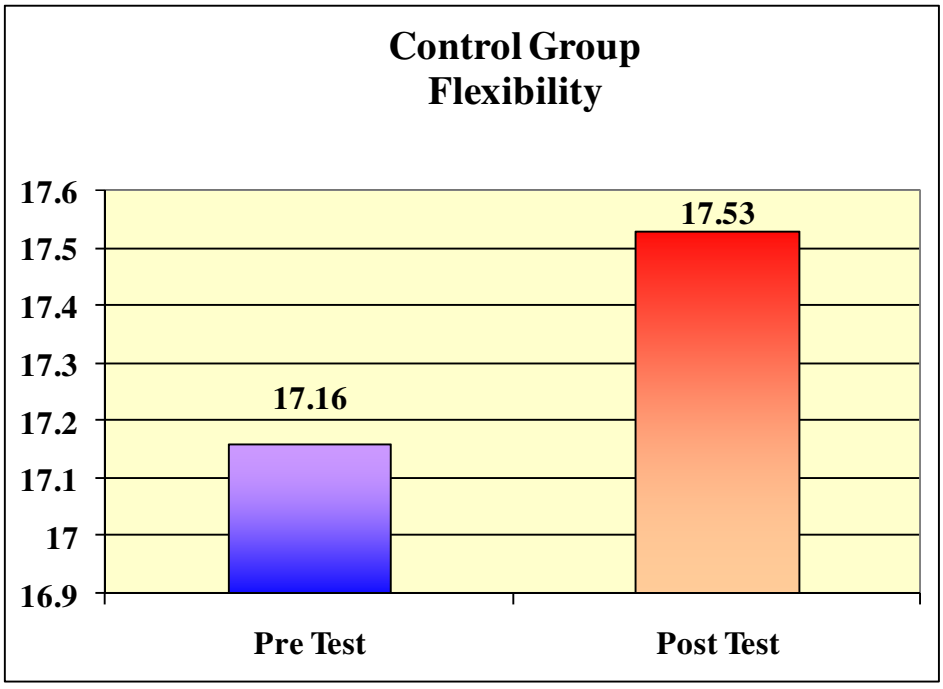

Fig 4.20: The Mean Values of (Pre and Post Test) Control Group On Flexibility

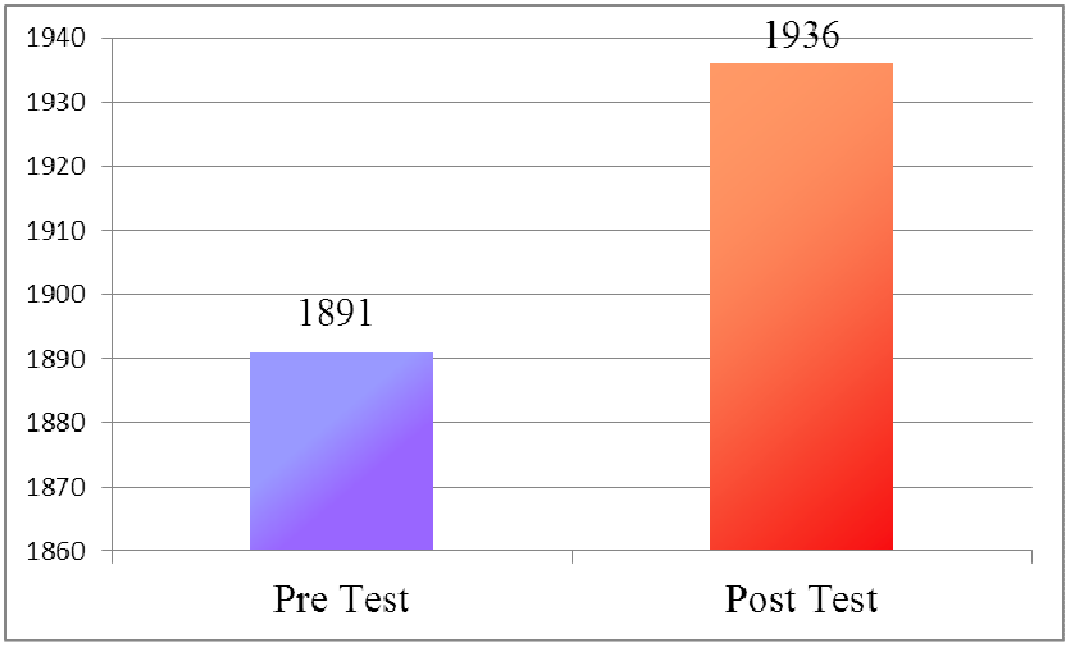

Fig 4.21: The Mean Values of (Pre and Post Test) Control Group on Cardio Vascular Endurance

Comparing the Effects of Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on Back Pain, Blood Pressure, Stress And Health Related Physical Fitness Components results of analysis of variance on pre-test means

Following the individualized effect of Yogic Practice group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group and Control Group the comparative effect analysis was done using analyses of covariance to visualize the values of experimental groups namely Yogic Practice group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) only on variables used in the study. The results of this were displayed in tables 4.4 to 4.8 as follows.

4.4 RESULTS OF ANALYSIS OF COVARIANCE

In the analysis of covariance, analyzing the data on pre test means and post test means among the Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on variables is the preliminary process. As the final step of analysis of covariance, the post test means were adjusted for differences, in the pre test means, and the adjusted post test means are tested for significance. Thus, the data were analyzed and the results on pre test, post test and adjusted post test are given below.

In the initial data analysis, 'F' test was applied to find out the significance of mean difference in the pre-test among the three groups of Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on selected variables of back pain, blood pressure, stress and health related physical fitness components. The analysis is presented in table 4.4

Table 4.4. Analysis of variance on pre-test means on Back Pain, Systolic Blood Pressure, Diastolic Blood Pressure, Stress and Health related Physical Fitness Components among Women

Variables		Source of variance	Sum of Squares	Degrees of Freedom	Mean Square	F ratio
Back Pain (Numbers)		Between sets	6.69	2	3.34	0.68
		Within sets	430.47	87	4.95	
Systolic Blood Pressure (mmHg)		Between sets	1244.09	2	622.04	1.85
		Within sets	29192.53	87	335.55	
Diastolic Blood Pressure (mmHg)		Between sets	668.89	2	334.44	2.03
		Within sets	14326.67	87	164.67	
Stress (Numbers)		Between sets	1800.69	2	900.34	1.85
		Within sets	42406.30	87	487.43	
Health Related Physical Fitness Components	Muscular Strength and Endurance (Numbers)	Between sets	200.02	2	100.01	1.72
		Within sets	5061.10	87	58.17	
	Flexibility (Centimeters)	Between sets	77.42	2	38.71	1.04
		Within sets	3232.90	87	37.16	
	Cardio Vascular Endurance (Meters)	Between sets	9574	2	4837	0.31
		Within sets	64683	87	15400	

***Significant at 0.05 level (3.16)**

4.5 RESULTS OF ANALYSIS OF VARIANCE ON POST-TEST MEANS

In the final data analysis, 'F' test was applied to find out the significance of mean difference in the post-test among the three groups namely Yogic Practice Group (YG) , PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on selected back pain, blood pressure, stress and health related physical fitness variables. The results are presented in table 4.5

Table 4.5. Analysis of variance on Post-test means on Back Pain, Systolic Blood Pressure, Diastolic Blood Pressure, Stress and Health related Physical Fitness Components of Women

Variables		Source of variance	Sum of Squares	Degrees of Freedom	Mean Square	F ratio
Back Pain (Numbers)		Between sets	304.42	2	152.21	24.57*
		Within sets	538.87	87	6.19	
Systolic Blood Pressure (mmHg)		Between sets	13526.76	2	6763.38	40.61*
		Within sets	14489.20	87	166.54	
Diastolic Blood Pressure (mmHg)		Between sets	6944.02	2	3472.01	63.51*
		Within sets	4756.03	87	54.67	
Stress (Numbers)		Between sets	65791.02	2	32895.51	49.25*
		Within sets	58112.80	87	667.96	
Health Related Physical Fitness Components	Muscular Strength Endurance (Numbers)	Between sets	409.36	2	204.68	4.00*
		Within sets	4455.53	87	51.21	
	Flexibility (Centimeters)	Between sets	299.09	2	149.54	4.19*
		Within sets	3101.80	87	35.65	
	Cardio Vascular Endurance (Meters)	Between sets	111604	2	55302	3.09*
		Within sets	757626	87	18038	

***Significant at 0.05 level (3.16)**

4.6 RESULTS

4.6.1 RESULTS OF PRE TEST MEANS

In testing the pre test means among the Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on variables used in the study, the obtained F-ratios were: 0.68 (Back pain), 1.85 (systolic blood pressure), 2.03 (diastolic blood pressure), 1.85 (Stress), 1.72 (muscular strength and endurance), 1.04 (Flexibility), 0.54 (Cardio vascular Endurance). The obtained F- ratios were statistically not significant as they failed to reach the required critical value (3.16) at 0.05 levels on variables such as back pain (0.68 $P<0.05$) , systolic blood pressure (1.85 $P<0.05$), diastolic blood pressure (2.03 $P<0.05$), Stress (1.85 $P<0.05$), Muscular Strength and Endurance (1.72 $P<0.05$), Flexibility (1.04 $P<0.05$), Cardio vascular Endurance (0.31 $P<0.05$) among the three groups of Yogic Practice group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group (PNFG) and Control group (CG). Thus, the obtained results on pre test mean confirm the random assignment of subjects into different groups was successful.

4.6.2 RESULTS OF POST TEST MEANS

In testing the post test means among the Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on variables, the obtained F-ratios were: 24.57 (Back pain), 40.61 (systolic blood pressure), 63.51 (diastolic blood pressure), 49.25 (Stress), 4.00 (Muscular Strength Endurance), 4.19 (Flexibility), 8.86 (Cardio vascular Endurance). The obtained F- ratios explained that after completion of treatment period of 12 weeks, the mean difference exist among the three groups of Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control group (CG) was statistically significant on

variables of Back pain (24.57 $P<0.05$) , systolic blood pressure (40.61 $P<0.05$), diastolic blood pressure (63.51$P<0.05$), Stress (49.25 $P<0.05$), Muscular Strength and Endurance (4.00 $P<0.05$), Flexibility (4.19 $P<0.05$), Cardio vascular Endurance (3.09 $P<0.05$).

Further to visualize the changes occurred from the baseline to post treatment of each training modules on criterion variables (back pain, stress, blood pressure and health related physical fitness) used in the present study, their status was already given in table 4.1 to 4.3 and also presented in figures 4.22 to 4.28.

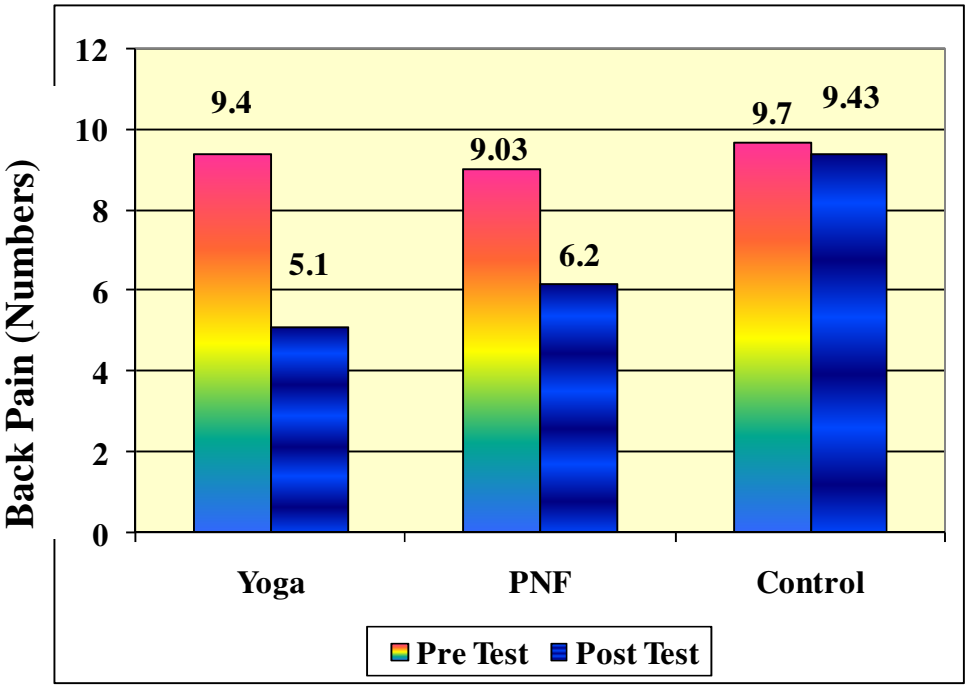

Fig 4.22: The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Back pain.

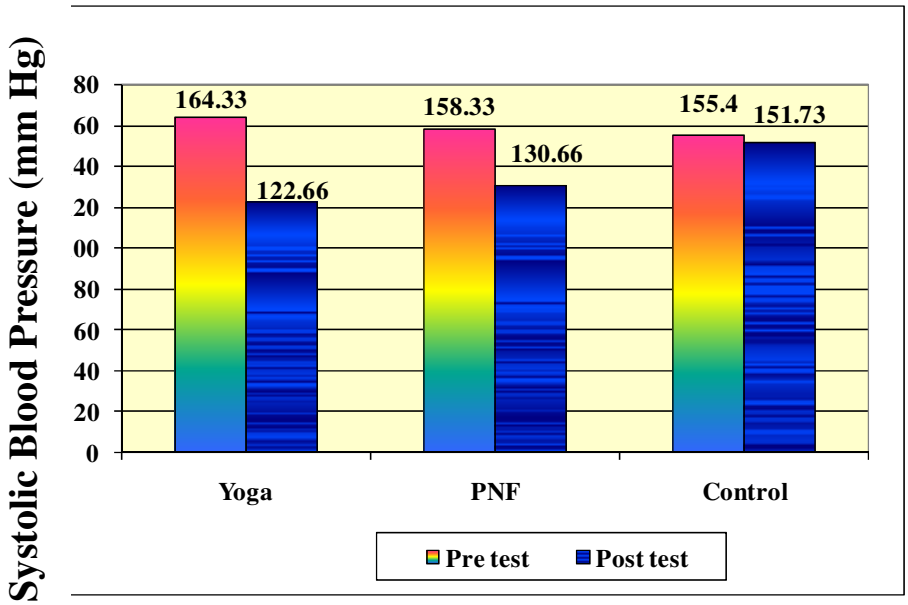

Fig 4.23 The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Systolic Blood Pressure

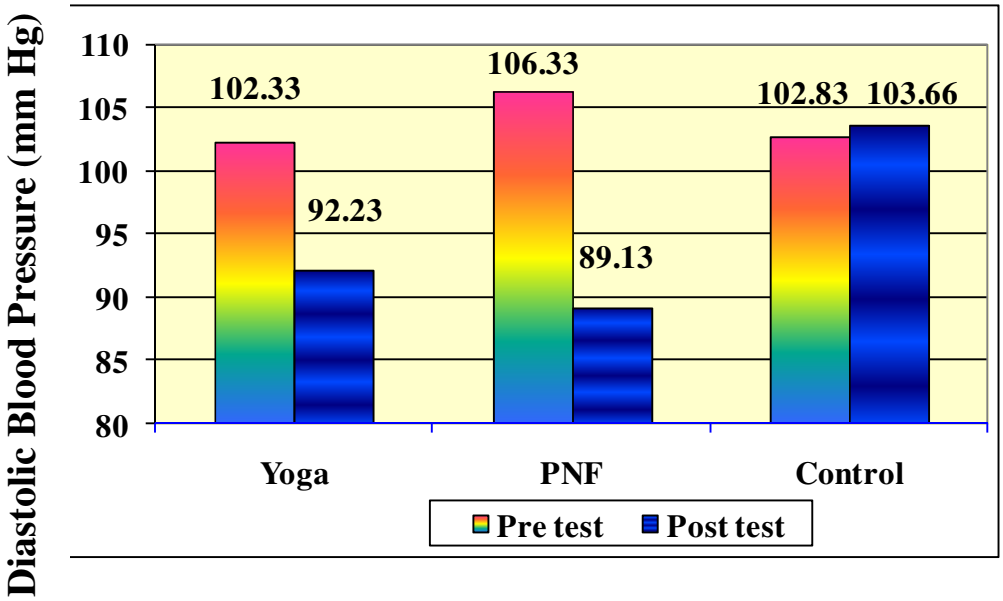

Fig 4.24 : The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Diastolic Blood Pressure

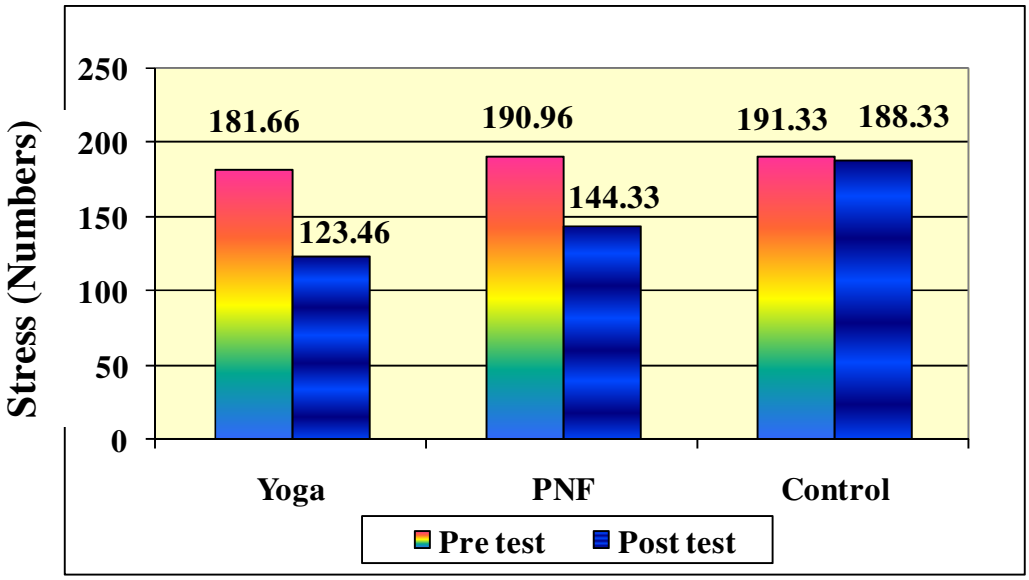

Fig 4.25 : The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Stress

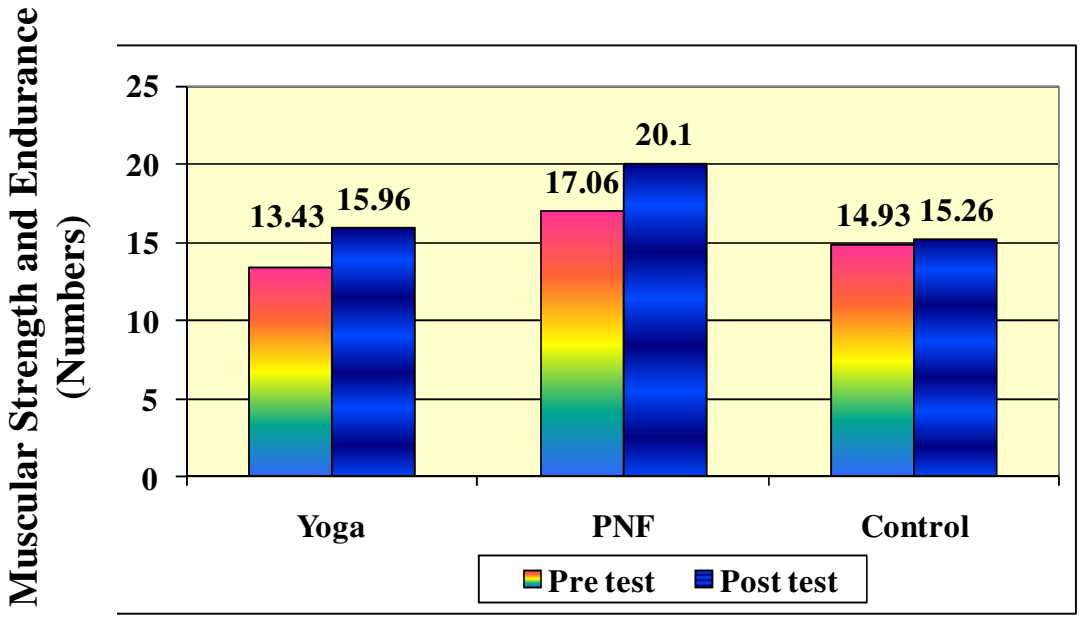

Fig 4.26 : The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Muscular Strength and Endurance

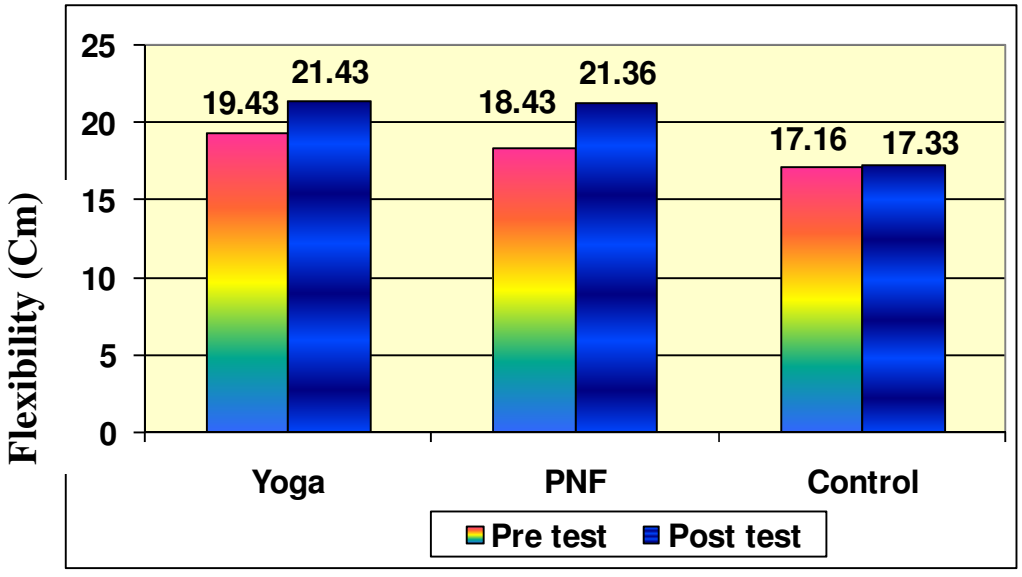

Fig 4.27 : The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Flexibility

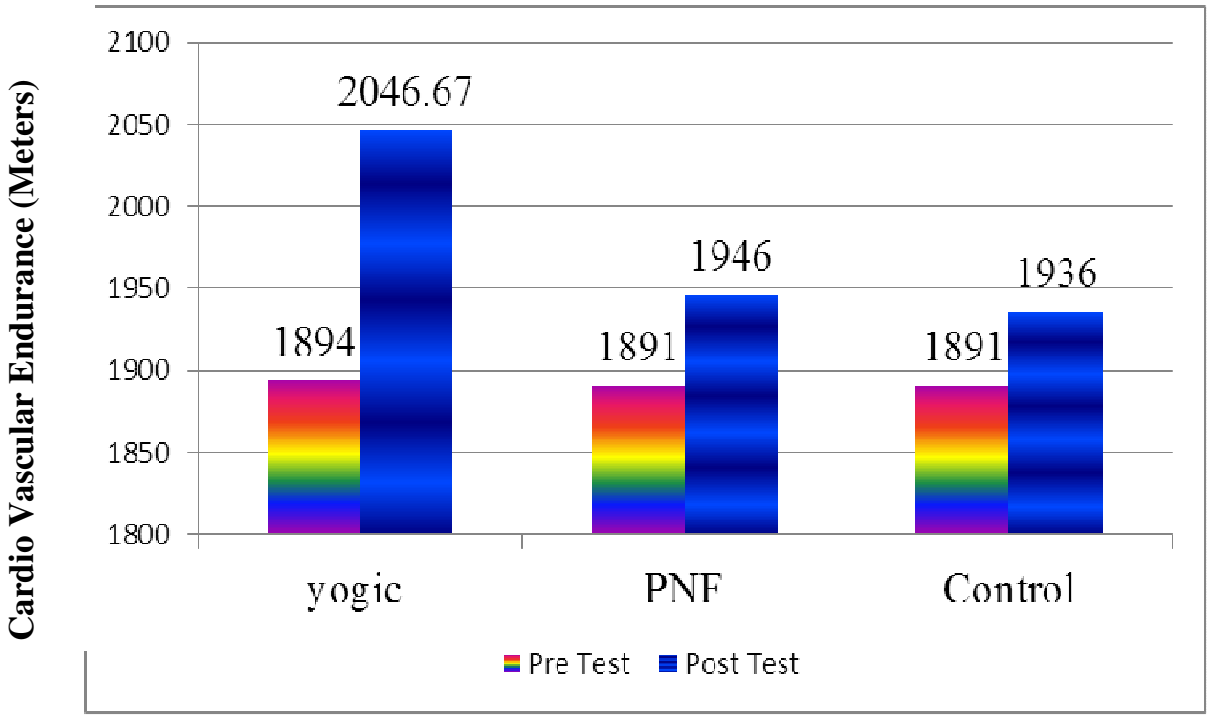

Fig 4.28 : The Mean Values of (pre test and post test) of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Cardio Vascular Endurance

RESULTS ON ADJUSTED POST-TEST MEANS

Analysis of co-variance was applied to determine whether the training programmes produced significantly different improvements in each variable. The analysis presented in Table 4.6.

Table 4.6. Analysis variance on adjusted Post - test means on Back Pain, Systolic Blood Pressure, Diastolic Blood Pressure, Stress and Health related Physical Fitness Components of Women

ANOVA FOR ADJUSTED MEAN

Variables		Source of variance	Sum of Squares	Degrees of Freedom	Mean Squares	F ratio
Back Pain (Numbers)		Between sets	258.63	2	129.32	41.75*
		Within sets	266.36	87	3.10	
Systolic Blood Pressure (mmHg)		Between sets	16444.68	2	8222.34	80.50*
		Within sets	8783.58	87	102.13	
Diastolic Blood Pressure (mmHg)		Between sets	6444.23	2	3222.11	64.06*
		Within sets	4325.81	87	50.30	
Stress (Numbers)		Between sets	53003.40	2	26501.70	67.72*
		Within sets	33657.09	87	391.36	
Health Related Physical Fitness Components	Muscular Strength Endurance (Numbers)	Between sets	131.79	2	65.90	26.38*
		Within sets	214.85	87	2.50	
	Flexibility (Centimeters)	Between sets	108.84	2	54.42	15.16*
		Within sets	308.76	87	3.59	
	Cardio Vascular Endurance (Meters)	Between sets	15392	2	76596	34.38*
		Within sets	91433	87	2230	

***Significant at 0.05 level (3.10)**

4.6.3 RESULTS OF ADJUSTED POST TEST MEANS

In testing the adjusted means among the Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on variables used in this study, the obtained F-ratios were: 41.75 (Back pain), 80.50 (systolic blood pressure), 64.06 (diastolic blood pressure), 67.72 (stress), 26.38 (muscular strength and endurance), 15.16 (flexibility), 34.38 (cardio vascular endurance). The obtained F- ratios of the above said variables among the three groups were statistically significant at 0.05 levels as they exceed the required critical value (3.16 df 2, 87). Thus, the obtained results on adjusted means statistically confirm that differences exist among the three different groups namely Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) after completion of treatment period on variables. Based on the results, in testing the hypothesis No.3 that there may be significant difference among the three different modalities of training namely Yogic Practice Group (YG), PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) on selected variables namely back pain, blood pressure, stress and health related physical fitness components is accepted. Further, to identify the group which is the source for such a significant mean difference, among the three groups as post-hoc test scheffe test was used. The results of post-hoc tests are presented in Table 4.7. & 4.8.

Table 4.7 Scheffe's post-hoc test for difference between the adjusted means on Back Pain, Systolic Blood Pressure , Diastolic Blood Pressure and Stress.

Variables	PNF	Yoga	Control	Mean Difference	F-ratio	C.V
Back Pain (Numbers)	6.47	5.08	-----	1.39	9.38*	**6.20**
	6.47	-----	9.18	2.70	35.38*	**6.20**
	-----	5.08	9.18	4.09	81.20*	**6.20**
Systolic Blood Pressure (mmHg)	131.12	120.47	-----	10.65	16.67*	**6.20**
	131.12	-----	153.48	22.36	73.45*	**6.20**
	-----	120.47	153.48	33.02	160.09*	**6.20**
Diastolic Blood Pressure (mmHg)	87.49	82.29	-----	5.20	8.07*	**6.20**
	87.49	-----	102.39	14.90	66.19*	**6.20**
	-----	82.29	102.39	20.10	120.48*	**6.20**
Stress (Numbers)	142.07	128.27	-----	13.80	7.30*	**6.20**
	142.07	-----	185.79	43.72	73.27*	**6.20**
	-----	128.27	185.79	57.53	126.83*	**6.20**

***significant at 0.05 level.**

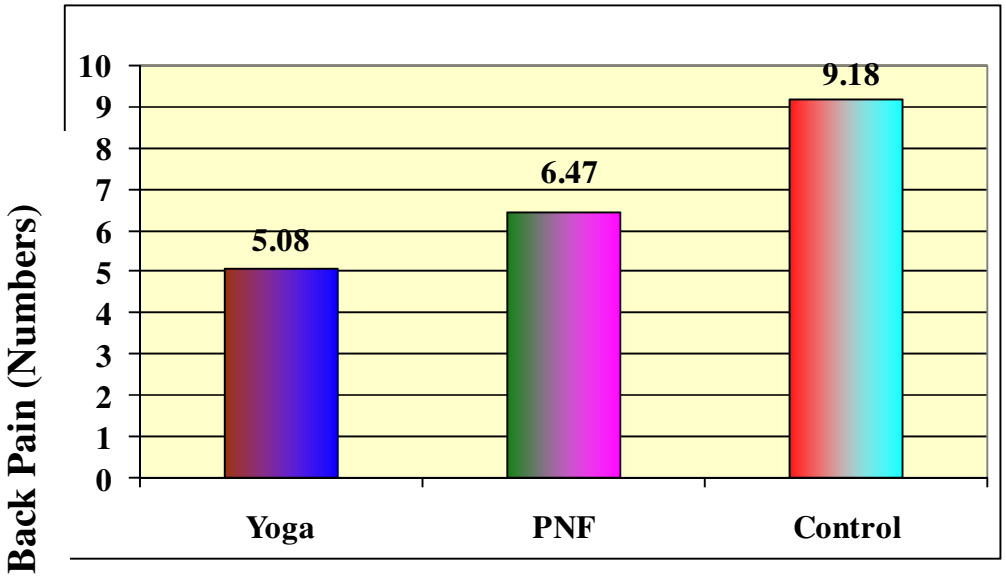

Fig. 4.29: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Back Pain

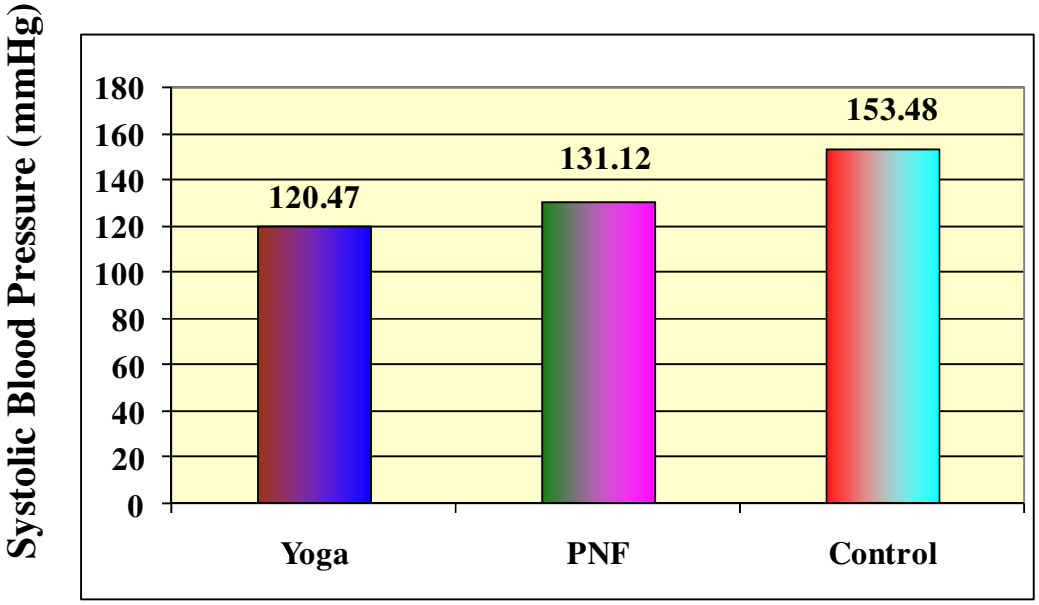

Fig. 4.30: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Systolic Blood Pressure

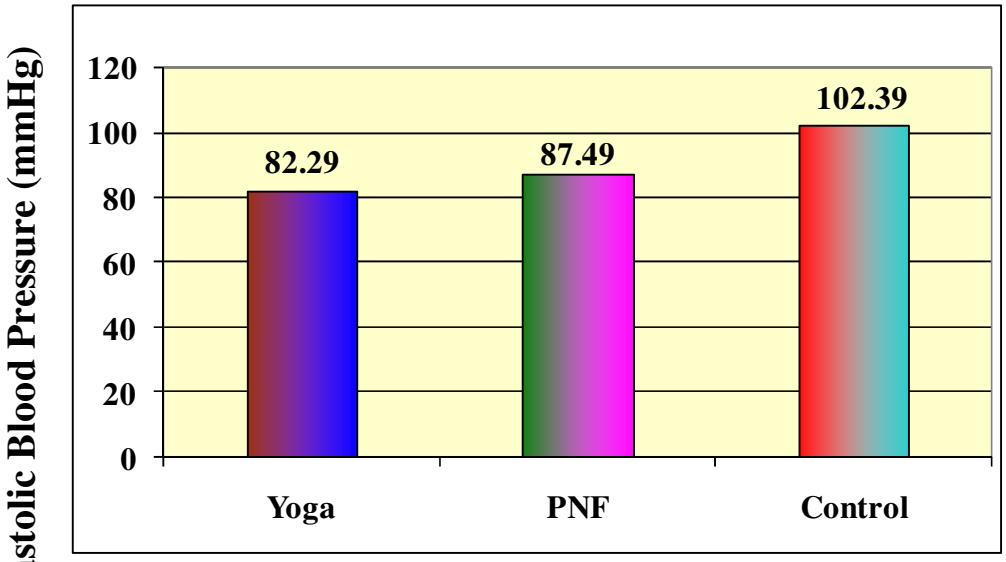

Fig. 4.31: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Diastolic Blood Pressure

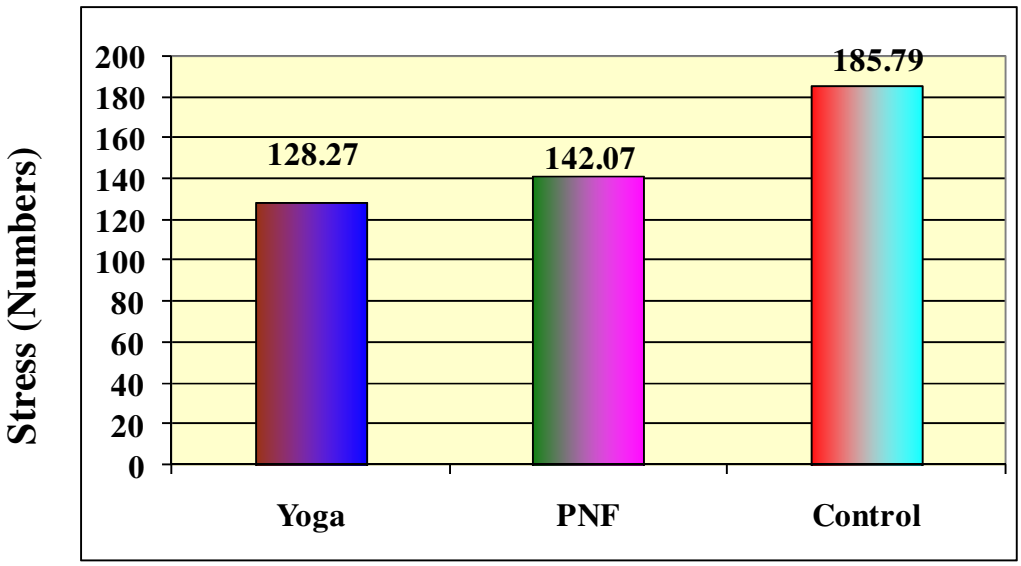

Fig. 4.32: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Stress

Table 4.8 Scheffe's post-hoc test for difference between the adjusted means on Muscular Strength Endurance, Flexibility and Cardio Vascular Endurance

Variables	PNF	Yoga	Control	Mean.Diff	F-ratio	C.V
Muscular Strength Endurance (Numbers)	18.34	17.53	-----	0.81	3.92	**6.20**
	18.34	-----	15.46	2.88	49.82*	**6.20**
	-----	17.53	15.46	2.07	25.80*	**6.20**
Flexibility (Centimeters)	21.28	20.42	-----	0.86	3.11	**6.20**
	21.28	-----	18.63	2.66	29.47*	**6.20**
	-----	20.42	18.63	1.79	13.43*	**6.20**
Cardio Vascular endurance (Meters)	105.76	111.22	-----	5.46	7.45*	**6.20**
	105.76	-----	112.44	6.68	13.80*	**6.20**
	-----	111.22	112.44	1.22	4.82	**6.20**

***significant at 0.05 level.**

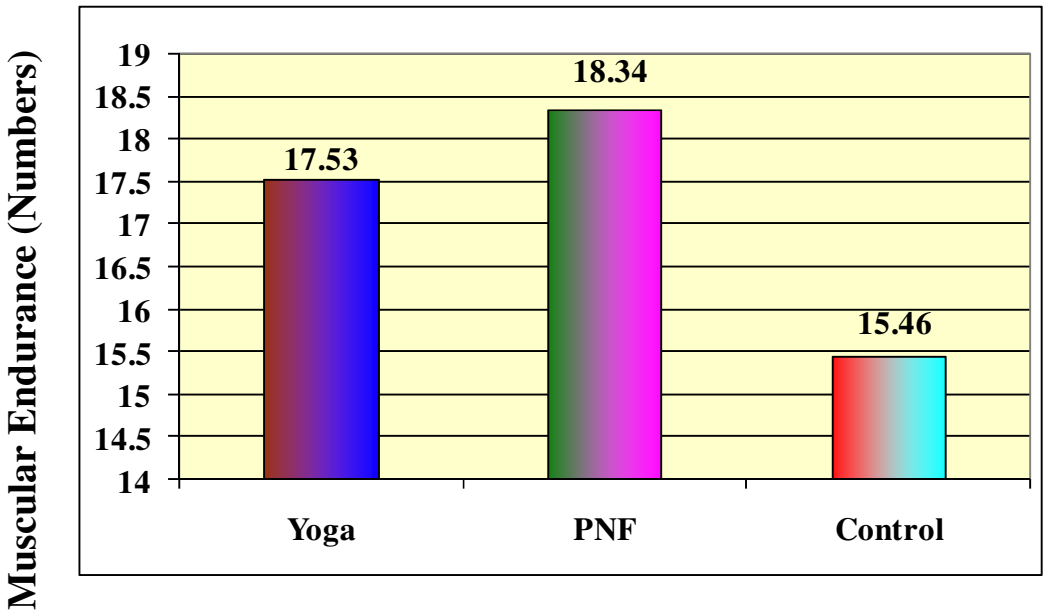

Fig. 4.33: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Muscular Endurance

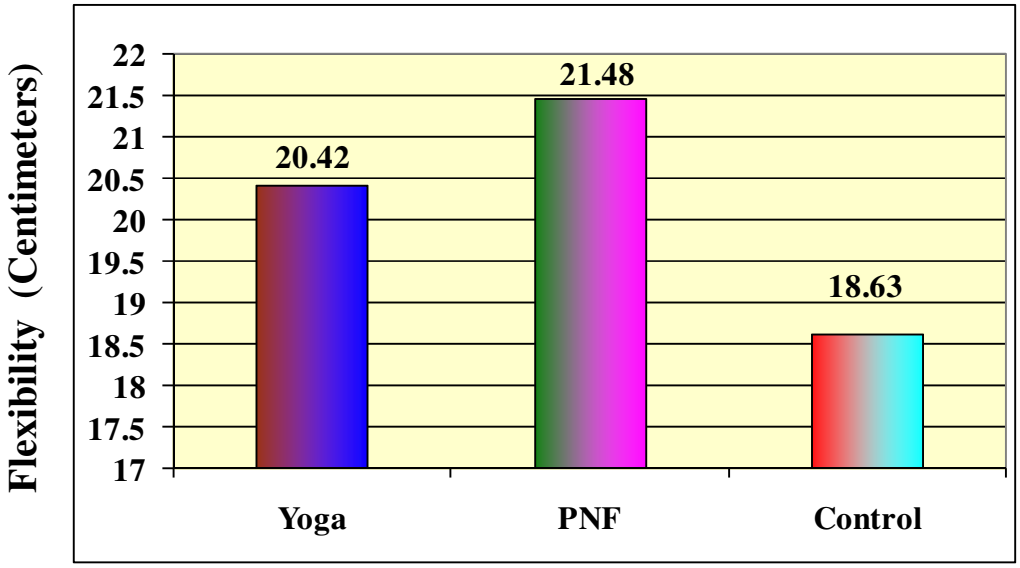

Fig. 4.34: The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Flexibility

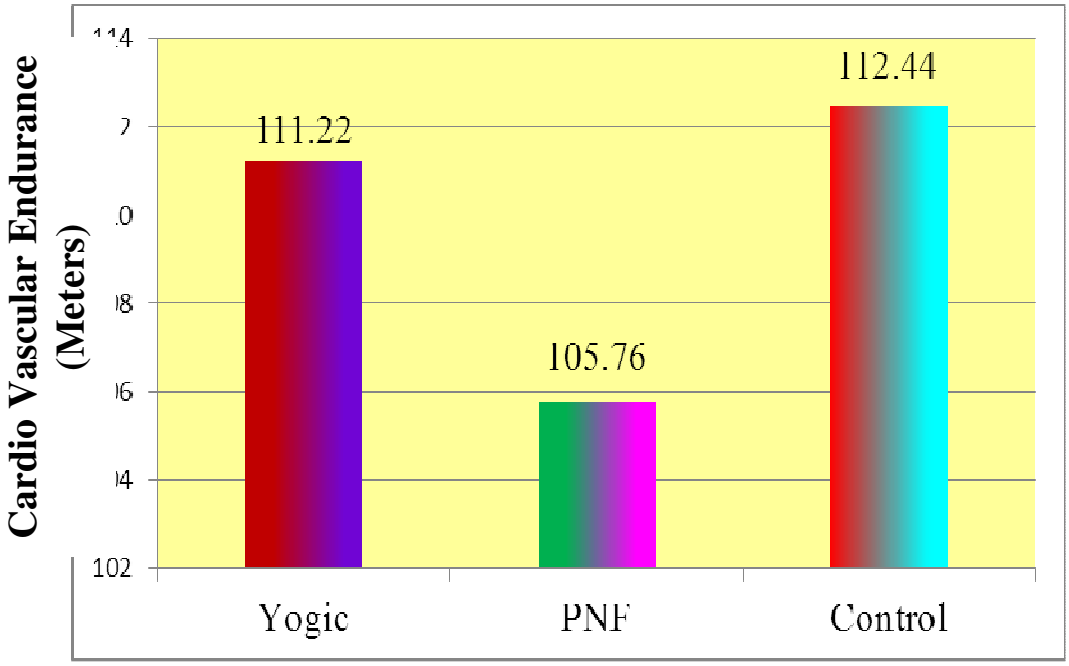

Fig. 4.35 The adjusted means of Yogic Practice Group, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group and Control Group on Cardio Vascular Endurance

4.7 RESULTS OF POST HOC TEST

In comparing the effect of Yogic Practice Group (YG) and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) from the obtained F ratios, it was observed that both training modules have produced YG showed superior performance over the PNFG on Back pain (9.38 P<0.05, 21%), systolic blood pressure (16.67 P<0.05, 8%), diastolic blood pressure (8.07 P<0.05, 6%), stress (7.30 P<0.05, 10%). Based on this, the formulated hypothesis No. 1 was accepted. Where as in the case of remaining variables PNFG showed superior performance over the YG on muscular strength and endurance (3.92 P>0.05, 4%), flexibility (3.11 P>0.05, 4%) and cardio vascular endurance (13.80 P>0.05, 4%).

In comparing the effects of Yogic Practice training and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group showed its dominance in the positive development of health related physical fitness components not much difference between the two groups. But there is Muscular strength endurance, flexibility and Cardio vascular endurance, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group are superior as compared to the Yogic Practice group. Thus the formulated hypothesis No.2 was accepted.

In comparing the effect of PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) and Control Group (CG) from the obtained F ratios, it was observed that PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) showed superior performance over the Control Group on back pain (35.38 P<0.05, 29%) , systolic blood pressure (73.45 P < 0.05, 15%), diastolic blood pressure (66.19 P < 0.05, 15%), stress (73.27 P < 0.05, 24%), muscular strength and endurance (49.82 P < 0.05, 16%), flexibility (29.47 P < 0.05, 13%), cardio vascular endurance (105.27 P < 0.05, 10%).

The decision made as follows, the results on comparative effects explained that PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) performed better in the variables of back pain, blood Pressure, stress, muscular strength and Endurance, flexibility and cardio vascular endurance as compare to Control Group (CG). Based on this, the formulated hypothesis No.2 related to this accepted.

4.8 COMPARING THE EFFECT OF YOGIC PRACTICE GROUP (YG) AND CONTROL GROUP (CG).

In comparing the effect of Yogic Practice Group (YG) and Control Group (CG) on selected back pain, blood Pressure, stress and health related physical fitness components, from the obtained F ratios, it was observed that Yogic Practice Group (YG) showed superior performance over the Control Group (CG) on back pain (81.20 $P < 0.05$, 8%) , systolic blood pressure (160.09 $P < 0.05$, 22%), diastolic blood pressure (120.48 $P < 0.05$, 20%), stress (126.83 $P < 0.05$, 31%), muscular strength endurance (25.80 $P < 0.05$, 13%), flexibility (13.43 $P < 0.05$, 10%), cardio vascular endurance (46.13 $P < 0.05$, 8%).

The decision made as follows, Results on comparative effects explained that Yogic Practice Group (YG) performed better in the variables of back pain, blood Pressure, stress, muscular strength and Endurance, flexibility and cardio vascular endurance as compare to Control Group (CG). Based on this, the formulated hypothesis No.1 related to this accepted.

4.9 DISCUSSION ON FINDINGS

The Present study combines several unique features that facilitate the analysis of the effects of Yogic Practice and PNF Stretching Exercises on Back pain, Blood Pressure, Stress and Health Related Physical Fitness on women. Specifically, the study incorporated an intervention for women who

had Back pain, Blood Pressure and Stress, where the yoga and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercises intervention was conducted 12 weeks after the occurrence of the Back pain, Blood Pressure and Stress.

In this study Paired t- test were used to test the effect of treatment groups individually for pre and post test groups on variables. The Analysis of covariance was used to test the adjusted mean differences among the treatment groups. If the adjusted post test result was significant, the scheffe's post hoc test was applied to determine the paired mean significance difference (Clark, 1972).

The results of the study indicate the effects of Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise on Back pain of women had significantly decreased. While testing the individual effects of each training, each one has significantly reduced. Likewise, when testing the comparative effects of the results obtained it was found that the Yogic Practice training group was superior to the PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group. Further it was observed from the comparative results that both the Yogic Practice training group and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group (PNFG) are well developed in the performance as compared to the control group. As far as the performance of control group is concerned, the observed mean difference from their pre-test to post test was not a significant one. The Common Causes of Back Pain is incorrect posture, improper movements, bad body mechanics and repetitive motion on joints or muscles. Disc injury can be the cause of prolonged back pain but muscles and ligaments may also be damaged or inflamed. Bulging Discs the sacroiliac joint can create pain when it does not sit in its housing correctly. Back pain may also occur due to infections, tumor, cysts and bone spurs. The Best Way to Heal Back Pain is combination of exercise and yoga, will give best results. But exercises should be done lightly.

Yogic Practice is important for reducing back pain and improving movement and function, although practitioners often find it difficult to maintain exercises when an injury is aggravated by back exercises. Back exercises are necessary for a healthy spine and can many times remove back pain but proper posture must also be practiced to greatly reduce back pain on daily basis. Cobra pose done mildly can really help sacroiliac displacement and herniated discs. A low Cobra pose is preferred for healing disc injuries. Choose a light Cobra pose and protect back. (http://www.yogacards.com/back_pain_problems.html)

Yogic Practice for back pain should begin with simple stretches for the lower back to strengthen the back and supporting muscles. Yogic Practice helped pain, fatigue, doubt, illusion, delusion, and despair that all think this feeling has reduced. Our results are consistent with previous yoga studies showing greater reduction of back pain. Like our studies most trials were randomized. The following studies are supporting to this thesis.

Williams et., al.,(2009) Using intention-to-treat analysis with repeated measures ANOVA (group x time), significantly greater reductions in functional disability and pain intensity were observed in the yoga group when compared to the control group at 24 weeks. A significantly greater proportion of yoga subjects also reported clinical improvements at both 12 and 24 weeks. In addition, depression was significantly lower in yoga subjects. Furthermore, while a reduction in pain medication occurred, this was comparable in both groups. When results were analyzed using per-protocol analysis, improvements were observed for all outcomes in the yoga group, including a greater trend for reduced pain medication usage. Although slightly less than at 24 weeks, the yoga group had statistically significant reductions in functional disability, pain intensity, and depression compared to standard medical care 6-months post intervention. Yoga improves functional disability, pain intensity, and depression in adults with

CLBP. There was also a clinically important trend for the yoga group to reduce their pain medication usage compared to the control group.

Galantino, et.al., (2004), found a modified yoga-based intervention may benefit individuals with CLB, but a larger study is necessary to provide definitive evidence. Also, the impact on depression and disability could be considered as important outcomes for further study. The additional functional outcome measures should be explored. This pilot study supports the need for more research investigating the effect of yoga for this population.

Tekur, (2008), Data conformed to a Gaussian distribution. There was a significant reduction in ODI scores in the yoga group compared to the control group. Seven (7) days of a residential intensive yoga-based lifestyle program reduced pain-related disability and improved spinal flexibility in patients with CLBP better than a physical exercise regimen.

Sherman, et.al., 2005, At 26 weeks, back-related function in the yoga group was superior to the book group. Yoga was more effective than a self-care book for improving function and reducing chronic low back pain, and the benefits persisted for at least several months.

Sherman, et.al., (2010) This study will provide the clearest evidence to date about the value of yoga as a therapeutic option for treating chronic back pain, and if the results are positive, will help focus future, more in-depth, research on the most promising potential mechanisms of action identified by this study.

STRESS

The results of the study indicate that the effect of Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise training on Stress of Women had significantly reduced. While testing the individual effects of each training, each one has significantly and reduced.

Likewise, when testing the comparative effects of the results obtained it was found that the Yogic Practice training group was superior to the PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group. Further it was observed from the comparative results that both the yogic Practice training and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise groups reduces the stress level as compared to the control group. As far as the performance of control group is concerned, the observed mean difference from their pre – test and post-test was not a significant one.

There are several symptoms of anxiety. Usually the patient feels constantly anxious. There is a feeling of tightness in the chest, which may be associated with the difficulty in swallowing or breathing. The subject may also experience pain in the chest, tension headache, pain in the joints and trembling in the limbs, tremors in hands and fingers, excessive perspiration, flushing of the face are some of the symptoms. Accelerated thoracic breathing, difficulty in rational thinking, lack of concentration and frequent urination are other important symptoms. Systolic blood pressure may rise up to 140-150 mmHg. Shifting of awareness consciously from thoracic breathing to the abdominal breathing helps a lot in reducing anxiety. Diversion of thought process, humor or participation in children's play relieves the tensions and anxiety.

Practicing on daily basis Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) stretching exercise group produce astonishing results on physical and mental well being, they also cease all thoughts and help to improve memory and reduce mental fatigue. It has also been substantiated by the results of the studies of Hartfiel et.el. (2011) this six-week yoga intervention resulted in significantly improved POMS-Bi and IPPA scores for the yoga compared to the wait-list control group for seven of eight measures of mood and well-being. These results show that even a short program of yoga is effective for enhancing emotional well-being and

resilience to stress in the workplace. We suggest that employers should consider offering yoga classes to their employees.

As stress levels and workloads increase, Yogic Practice is becoming a popular means of stress management and physical relaxation. The main aim of Yogic Practice is to manage stress and anxiety by bringing our body and mind to a peaceful state. Everyone, regardless of age and gender, can practice yoga, because of its wonderful combination of body movements and meditation. Besides controlling breathing, proper balance, flexibility and strength, it also helps you maintain a good physical condition to help reduce stress. The positions range from lying on the floor with a completely relaxed body to more difficult yoga poses that take a minimum of five years of practice to master. No matter what type of yoga practice, focus on the poses that feel comfortable and offer better relaxation for us. When practicing yoga, controlling our breath is important to zone in on the essence of yoga. Yogic breath helps to gain control of our body and mind. Follow this technique to control breathing and pay attention to it while practicing different poses.

Another meta-analysis by Bower, et. al., (2005) reviewed the results of nine studies conducted with cancer patients and survivors yielded modest improvements in sleep quality, mood, stress, cancer-related distress, cancer-related symptoms, and overall quality of life. Results from the emerging literature on yoga and cancer provide preliminary support for the feasibility and efficacy of yoga interventions for cancer patients, although controlled trials are lacking. Further research is required to determine the reliability of these effects and to identify their underlying mechanisms.

From the results of the present study and literature, it could be concluded that significant difference exists between Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise in Stress.

BLOOD PRESSURE

The Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise experimental groups had significantly decreased the Systolic and Diastolic Blood Pressure as compared to the control group. While testing the individual effects of each training, each one has significantly decreased. Likewise, when testing the comparative effects of the results obtained it was found that the Yogic Practice training group was superior to the PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise Group. As far as the performance of control group is concerned, the observed mean difference from their pre test to post test was not a significant one.

High blood pressure (HBP) or hypertension means high pressure (tension) in the arteries. Arteries are vessels that carry blood from the pumping heart to all the tissues and organs of the body. High blood pressure does not mean excessive emotional tension, although emotional tension and stress can temporarily increase blood pressure. Normal blood pressure is below 120/80; blood pressure between 120/80 and 139/89 is called "pre-hypertension", and a blood pressure of 140/90 or above is considered high.

The top number, the systolic blood pressure, corresponds to the pressure in the arteries as the heart contracts and pumps blood forward into the arteries. The bottom number, the diastolic pressure, represents the pressure in the arteries as the heart relaxes after the contraction. The diastolic pressure reflects the lowest pressure to which the arteries are exposed.

An elevation of the systolic and/or diastolic blood pressure increases the risk of developing heart (cardiac) disease, kidney (renal) disease, High BP is a risk for heart disease because the heart is working harder than normal thus putting the heart and arteries under a great strain, (atherosclerosis or arteriosclerosis) eye damage and stroke (brain damage).

These complications of hypertension are often referred to as end-organ damage because damage to these organs is the end result of chronic (long duration) high blood pressure. For that reason, the diagnosis of high blood pressure is important so efforts can be made to normalize blood pressure and prevent complications.

It was previously thought that rises in diastolic blood pressure were a more important risk factor than systolic elevations, but it is now known that in people 50 years or older systolic hypertension represents a greater risk. There are many factors that can cause high blood pressure. Here are a few of them. Insulin resistance, High level of renin (hormone), too much alcohol, aging, obesity, too much salt, potassium deficiency, lack of exercise, stress, inherent factors, smoking. These are just the main contributors to hypertension.

During any exercise the strain on muscles increases, the requirement for blood and oxygen increases but in Yogic Practice the requirement goes down as there are no strains and every muscle is relaxed, the requirement for blood and oxygen goes down. This also reduces the strain on mind, the mind also becomes stable and focused. Also because of twists and stretched postures, the functioning of endocrine glands, digestive organs, heart and other organs improves. To achieve this even simple Yogic Practice are helpful, one can easily practice these Yogic Practice and get the best result.

Statistics about yoga stress management prove beyond doubt that Yogic Practice can be used as an effective therapy to fight stress related problems like blood pressure. In healthy persons according to medical professionals BP increases from about 80/45 in infants, to about 120/80 at age of 30 to about 140/85 at age 40 and above. Blood pressure increases with age because the arteries loose elasticity.

If the blood pressure increase and remain above normal, one has to follow strict medical advice and take prescribed medicines by medical

professional. However, taking medicines alone is not enough to manage one's High BP condition. Those who are affected by High BP should change their life style in their day to day activities. Those who are affected by high Bp may have to give-up smoking if they are a regular smoker, and also to reduce their alcohol intake, reduce salt in their food and avoid taking red meat.

Yogic Practice and Meditation helps greatly in keeping one's Bp under control who are suffering from Blood pressure/hypertension. Daily practice of such exercises and Meditation will help in maintaining blood pressure and hypertension to normal level. Murthy et.al., (2011), After starting non pharmacological approach of naturopathy and yoga, Systolic blood pressure came down from mean of 139.6 to 129.6 where as it came down from 91.2 to 86.1 for diastolic blood pressure. At the end of one year out of 57 patients who came for follow-up, 14 cases were found to have blood pressure within normal ranges without any medication over the previous 12 months. Naturopathy and yoga therapy can be considered as a valuable non pharmacological approach in treatment of hypertension.

The relaxation and exercise components of yoga have a major role to play in the treatment and prevention of high blood pressure (hypertension). A combination of biofeedback and yogic breathing and relaxation techniques has been found to lower blood pressure and reduce the need for high blood pressure medication in people suffering from it. Research shows that when people go into an alpha brain wave state, as they do when practicing yoga, blood pressure is lowered and the heart and brain come into entrainment, when we access our highest levels of intelligence. For example, Cade , et.al., (2010) Resting systolic and diastolic blood pressures improved more in the yoga group than in the standard of care group.

Regular practice of Yoga reduces blood pressure to the tune of 10 to 15 mm / Hg (observed facts, good evidence exists to support this

observation). Yoga can reduce weight loss which in turn reduces blood pressure. Regular Yoga performers are less likely to suffer from Hypertension than their age & sex matched counterparts. This result has been studied and proven at our center. The night 'dip' of blood pressure a phenomenon seen in normal people and which can be absent in some hypertensive is usually restored as observed at our center. Casual Shavasana and Omkar chanting each can reduce the B.P. by about 10 - 15 mm / Hg even in an untrained person who may not practice Yoga regularly.

Probable mechanism achieved by practicing yoga which relieves Hypertension could be as follows. Blood pressure increases by sustained activation of 'Flight & Fight' response of the body. Yoga effectively switches off the response and brings adrenaline levels down and reduces blood pressure. This postulate can be backed by good amounts of evidences. The chronic stress induced sustained muscular contraction reduces lumen diameter of blood vessels in the muscles. It in turn increases blood pressure (just as compressing a water pipe increases force of water flow). Stretching of muscles and relaxing the same as done in Yogic exercise reverts this effect. Sustained muscular contraction sends hostile signals to the brain, alerting it to impending danger. This does secrete stress hormones and neurotransmitters associated with stress and high B.P. This possibly reverted by constant practice of Yoga. Platelet agreeability and stickiness of blood increases inappropriately, tend to produce a 'hyper coagulable' state of blood, and increase blood pressure in turn. It is proven during preliminary studies, that regular practice of Yoga reduces Platelet aggregation. Certain postures in Yoga do offer controlled pressure on kidneys and the adrenals thereby possibly regulating blood supply to these vital organs which mainly regulate B.P. through secretions of rennin, angiotensin, adrenalin etc. Regular Yoga may reduce stress hormone 'aldosterone' which is a potent vasoconstrictor (which contracts blood vessels thus increasing B.P.). Preliminary evidences have noted this fact.

Preliminary studies also point out to the fact that regular Yoga practice may reduce 'Vasopressin' another stress hormone secreted by pituitary gland in the brain. Vasopressin increases B.P. by vascular contraction. The medulla oblongata in the brain has the respiratory center and the vasomotor centre (which regulates the B.P.) side to side. Fast breathing in stressful situations tends to overspill the electric signals over vasomotor centre thus increasing B.P. Yoga and Pranayama in turn regulate breathing and hence may reduce the signal overspill from respiratory center, thus reducing B.P.

From the results of the present study and literature, it is concluded that the significant difference exists between Yogic Practice training and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise in decreasing dependent variable on Systolic and diastolic blood pressure.

It is inferred from the above literatures and from the results of the present study systematically designed Yogic Practice training and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise reduce the stress, back pain, blood pressure and Health related Physical Fitness improve the performance of Muscular Endurance, Flexibility and Cardio vascular Endurance. Systematically and scientifically designed Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise may be given due recognition and compulsorily implemented in the training program of all the Health clubs, Offices and educational institutions in order to achieve maximum advantage in physical and mental activities.

HEALTH RELATED PHYSICAL FITNESS

Likewise though the effects between Yogic practice training group and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group showed its dominance in the positive development of health related physical fitness components not much difference between the two groups. But there is Muscular strength and endurance, flexibility and Cardio

vascular endurance, PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise group are superior as compared to the Yogic Practice group. It is an acceptable fact that the Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise is best suited for developing health related physical fitness components flexibility, cardio vascular endurance and Muscular endurance mainly improving the flexibility. Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise are best complements to flexibility. They also increase the flexible. It has also been substantiated by the results of studies of Tran_et.al.,.(2001) Ten healthy, untrained volunteers (nine females and one male), ranging in age from 18-27 years, were studied to determine the effects of hatha yoga practice on the health-related aspects of physical fitness, including muscular strength and endurance, flexibility, cardio respiratory fitness, body composition, and pulmonary function. These findings indicate that regular hatha yoga practice can elicit improvements in the health-related aspects of physical fitness.

Chen. et al., (2009) the purpose of this study was to investigate the effect of yoga exercise on the health-related physical fitness of school-age children with asthma. 1. Compared with children in the general population, the study subjects (n = 30) all fell below the 50th percentile in all five physical fitness items of interest. There was no significant difference in scores between the two groups at baseline (i.e., pre-exercise) for all five fitness items. 2. Research found a positive association between exercise habit after school and muscular strength and endurance among asthmatic children. 3. Compared to the control group, the exercise group showed favorable outcomes in terms of flexibility and muscular endurance. Such favorable outcomes remained evident even after adjusting for age, duration of disease and steroid use, values for which were unequally distributed between the two groups at baseline. 4. There was a tendency for all item-specific fitness scores to increase over time in the exercise group. The GEE

analysis showed that yoga exercise indeed improved BMI, flexibility, and muscular endurance. After 2 weeks of self-practice at home, yoga exercise continued to improve BMI, flexibility, muscular strength, and cardiopulmonary fitness.

It is inferred from the above literatures and from the results of the present study systematically designed Yogic Practice and PNF (Proprioceptive Neuromuscular Facilitation) Stretching Exercise training improve the performance of the middle aged women. Systematically and scientifically designed Yogic Practice and PNF stretching exercises may be given due recognition and compulsorily implemented in the training programme of all age women in order to achieve maximum advantage in physical and mental activities.