



## EFFECTS OF SELECTED YOGIC AND NATUROPATHIC PRACTICES ON BLOOD PRESSURE

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### **Abstract**

*This study was conducted to examine the effect of yoga and Pranayama on blood pressure female subjects. Systolic and diastolic blood pressure was studied in 45 subjects. This experiment was conducted to find out the effects Yoga and naturopathy on hypertension (Blood pressure). Group A was instructed the Yoga asana, whereas Group B. was instructed to do pranayamas for the period of 8 weeks, and group C (Control group) was instructed to follow their regular routine without any alteration in diet and pranayamas. It was an eight week training Programme. Pre test was conducted in the beginning and post test was conducted after eight weeks training to see the effect or control of the blood pressure in the female. From the study it was observed that significant difference in the mean values of systolic and diastolic blood pressure between experimental group and control group was also statistically significant ( $P < 0.01$  and  $P < 0.001$  respectively). The systolic and diastolic blood pressure showed significant Positive correlation with age in the experiment group ( $r_1$  systolic = 0.902 and  $r_1$  diastolic = 0.777) as well as in the control group ( $r_2$  systolic = 0.816 and  $r_2$  diastolic = 0.793). Our results indicate that yoga and pranayamas reduces the elevated blood pressure.*

**Key Words:** *Blood Pressure, Systolic Blood Pressure, Diastolic Blood Pressure.*

### **Introduction**

India is a developing country, scaling new heights every day in both domestic as well as international facade. Since independence our country has progressed immensely & comprehensively in all fields like Economy, Industry, Agriculture, Health & Medicine, Information Technology, Overseas Trade, International Politics & Diplomacy, and various other aspects which have brought our nation amongst the few most potential powers of the world.

### **Hypertension an Alarming Disease**

#### **What is hypertension?**

According to WHO guidelines 2003, a persistent elevated blood pressure exceeding over a systolic pressure above 140 and a diastolic pressure above 90 is termed as hypertension.

### **Blood Pressure**

Blood pressure refers to the amount of outward pressure exerted on the walls of arteries & vein by the blood inside them. Hypertension occurs when the blood pressure in the system gets high enough to start causing problems in the body. Conditions that cause the blood pressure to rise are usually related to the blood vessels being either constricted or overfilled; in both cases, it takes more force to pump the blood through the vessels.

### **Systolic & Diastolic Blood Pressure**

The blood pressure is measured with an instrument called a sphygmomanometer in millimeters of mercury. The highest pressure reached during each heart beat is called systolic pressure and lowest between two beats is known as diastolic pressure. The first gives the pressure of the contraction of the heart as it pushes the blood on its journey through the body and indicates the activity of the heart. The second represents the pressure present in the artery when the heart is relaxed and shows the condition of the blood vessels. Theoretically, the blood pressure is considered normal when it is 120/80, but practically when it goes up to 140/90, may still be normal. Within this range, the lower the reading, the better the metabolism of the body. **Blood pressure between 140/90 and 160/94 is considered border line area. From 160/96 to 180/114, it is classed as moderate hypertension, while 180/116 and upwards is considered severe.**

A raised diastolic pressure is considered more serious than raised systolic pressure as it has a serious long term effect. When blood pressure rises above normal, the blood's normal pulsating is replaced by pounding; even a very slight rise in blood pressure is significant, since the heart beats over one hundred thousand times per day. This relenting battering is hard on the walls of the blood vessels and weakens them. The high pressure can also cause damage to various organs. In the kidneys, the excess pressure can damage the vessels that filter waste products from the blood, making the kidneys ineffective and leading to kidney failure. In the brain, a type of stroke can result when the damaged vessels rupture. Stroke is the third leading cause of death in the India (after heart disease and cancer), and high blood pressure is the main risk factor. In the heart, the hammering damages the arterial linings, hastening cholesterol buildup which can lead to a heart attack. Uncontrolled hypertension also causes the heart muscle itself to work harder and eventually lose its ability to pump effectively, a condition that can lead to congestive heart failure.



**Thus, Naturopathy & Yoga will come out to be a definite, affirmative & permanent Adjunctive Therapy in Control & treatment of this systemic hypertension disorder.**

### **Methods and Procedure**

In this chapter, the procedures to be adopted for the selection of subjects, design of the selection of variables, training program, orientation of the subjects, criterion measures, reliability of data, collection of data and statistical procedures that are required to analyze the data will be discussed.

### **Selection of Subjects**

The present study was conducted on 45 hypertensive female patients between the age group of 40-65 yrs and **not currently taking any anti-hypertensive medications**. The subjects were selected from the Gandhi Samarak Bhawan, Chandigarh considering their willingness and feasibility to undergo the trial and their faith and positive attitude towards the Yoga and Naturopathy and were divided into three groups, One Control (15 subjects) and Two Experimental Groups (15 subjects each). The Experimental group was further sub-divided into two groups of 15 subjects in each group .Group I was given (Yoga Group) and Group II (Diet Modification group).

### **Design of the Study**

Participants were recruited through purposive sampling from and subjects were assigned to the groups, each group comprising of 15 subjects. Measurements of the variables were taken at the beginning of experimental training and the mean of these variables were recorded as **pre-trial records**. Similarly at the end 8 weeks of experimental training season, average of same variables were taken again & recorded as **post trial records** as mentioned in table–I.

During trial the Group-I and Group –II subjects were delivered yogic & naturopathic practices respectively for B.P control. The 8 week yoga & dietary program included information and group support in learning yogic health-related factors principles and stress reduction techniques. The subjects were explained the purpose of the trial and the way of executing the trial by demonstrating the Yogic Asanas and Pranayama. They were explained the importance and role of diet in controlling the blood pressure. Training session for Yogic Asanas were given to group I and diet alteration was recommended to group II as mentioned in Table-II and III respectively. The controlled groups were not allowed to participate in any of the training session and dietary modification programme.

### **Selection of the Variables**

In consultation with experts of the field, reviewing the literature and considering the feasibility specially from the point of view of availability of equipments and time factor; the following variable are selected for the study:-

- 1) Systolic Blood pressure
- 2) Diastolic Blood pressure

### **Armamentarium**

- Sphygmomanometer
- Stethoscope

### **Orientation of the Subjects**

Before training, subjects were oriented the purpose of the study and the importance of training programme. The techniques of performing the Yogic asanas were explained to the subjects by the means of demonstration and instructions by the investigator in order to handle them and get their full co-operation. They were motivated to strictly follow the dietary recommendations so as to ensure reliable data. The investigator with the help of assistant measured and recorded all the variables, both pre and post trial. The Doctors of Gandhi Samarak Bhawan, Chandigarh who were well versed with the training program helped the investigator all through the experimental period.

### **Collection of Data**

Pre-trial and post-trial records were collected. The data so collected from three groups on selected variables was used for statistical analysis to find out whether there was any significant reduction in blood pressure between the pre and post trial measures and thus t – test was applied.

### **Statistical Procedure**

The data obtained was compiled and tabulated variables –wise. At the initial stage the values of means and standard deviations and t-ratios of the variables are computed to know the level of significance between pre-test and post-test mean



scores of all the groups of middle-aged female patients sample. Analysis of variance (ANOVA) was applied to know the significance of difference among various groups against each variable and where the difference were found significant at.05 level of confidence, the Scheffe's post hoc test was applied to know the direction of differences.

### Results and Discussion

In this chapter analysis and interpretation of the data results obtained from the statistical analysis and discussion on results and hypothesis are presented. This chapter is divided into two sections. In Section I the intra group comparison of subjects of Yoga group, dietary modification group and control group on selected variables are presented. The results of this section are presented from table 1 to 9 and graphic representation has been provided from figure 1 to 9.

Section-I is further sub-divided into three sub-sections: Section-I (a), I (b) and I (c). In Section I (a) comparative results of pre-test & post-test mean scores of experimental subjects of yogic group on all the chosen variables have been described. Section-I (b) deals with the comparative results pre-test & post-test mean scores of experimental subjects of Dietary modification group on all the four chosen variables. Section I (c) presents the comparative results of pre-test and post-test mean scores of subjects of controlled group on all the chosen variables.

Section II deals with the analysis of variance (ANOVA), applied on all the four variables of the selected groups. Where the 'F' – ratio for post-test mean has been found statistically significant, Scheffe's post hoc test is applied to find out that which of the three paired means differed significantly. Section II deals with the comparative results of post-test mean scores of middle-aged female patients of various groups on all the variables

### Section - 1

#### Physiological Differentials within Each Group

This section presents the comparative results of pre-test and post-test mean scores of subjects of Yogic asana group, dietary group and controlled group on chosen physiological ability variables. This section is further sub-divided into I (a), I (b) and I (c).

#### Section- I (A)

In this section, comparative results of pre-test and post-test mean scores of yogic group of subjects on the chosen physiological variables are presented.

**Table 1, Paired T-Test Significance of Difference between Pre-Test and Mid-Test Variables of Yogic Group**

S.No	VARIABLE	PRE-TEST		POST-TEST		MD	SEMD	df	t-value
		M1	SD1	M2	SD2				
1.	Systolic Blood Pressure	155.60	1.89	140.74	4.81	4.85	5.611	4	10.25*
2.	Diastolic Blood Pressure	92.34	0.70	82.21	2.84	10.13	3.359	14	11.68*

\*Significant at 5%,  $t > 2.145$

### Results

In table 1 comparative result of pre-test and mid-test mean scores of yogic group on all the selected variables are presented. The results presented in table-1 show that the mid-test mean score of yogic group on systolic blood pressure, diastolic blood pressure are 140.74, 82.21 which are lower than the pre-test mean scores i.e. 155.6, 92.34 respectively .

The result indicates that there has been significant change between pre-test records and those at the mid of the trial. As obtained the t-value of systolic blood pressure is 10.25, diastolic blood pressure is 11.68. Both of these t-values are greater than the table value of  $t = 2.145$  required to be significant at five percent level of confidence. In case of BMI t value comes out to be 0.74 which is less than the table value.

### Discussion

The statistically difference between pre-test and post-test mean scores shows that the training of yogic asanas has improved significantly the systolic blood pressure, diastolic blood pressure. This proves our hypothesis to be apt as yoga has shown a comprehensive improvement in overall cardiac profile of hypertensive patients; hence it should be promoted as a definite treatment for high blood pressure.



**Table 2, Paired T-Test Significance of Difference between Pre-Test And Post-Test Variables of Diet Modification Group**

S.No	N=15 VARIABLE	PRE-TEST		POST-TEST		MD	SEMD	df	t-value
		M1	SD1	M2	SD2				
1.	Systolic Blood Pressure	154.03	1.61	146.78	3.77	7.25	1.157	14	24.29*
2.	Diastolic Blood Pressure	92.32	3.16	88.77	4.18	3.55	3.786	14	3.63*

\*Significant at 5%,  $t > 2.145$

### Results

Table 2 depicts that significant difference between pre-test and post-test mean scores of diet modification group on all the variables has been found. From the results it is concluded that diet modification training has recorded lower mean value with post-test  $m=146.78$  on systolic blood pressure,  $m=88.77$  on diastolic blood pressure,  $m=21.51$  respectively than the pre-test mean scores 154.03 and 92.32. The Statistically significant differences have been found between pre-test and post-test mean scores of diet modification group with  $t=24.29$  on systolic blood pressure,  $t=3.63$  on diastolic blood pressure,  $t=24.49$ . All these t values are greater than the table value of  $t=2.145$ .

### Discussion

From the results of pre-test and post-test of diet modification group it is clearly evident that diet modification group of the subjects had improved significantly all the variables namely systolic blood pressure, diastolic blood pressure. The significant improvement on all the above variables shows that diet modification play an important role in controlling systemic hypertension. This concretizes our hypothesis and establishes the fact that by incorporating modifications in dietary pattern high blood pressure of person suffering from primary hypertension can be controlled.

**Table 3, Paired T-Test Significance of Difference between Pre-Test and Post-Test Variables Of Control Group**

S.No	N=15 VARIABLE	PRE-TEST		POST-TEST		MD	SEMD	Df	t-value
		M1	SD1	M2	SD2				
1.	Systolic Blood Pressure	155.60	1.89	156.88	1.71	1.28	0.888	14	5.60*
2.	Diastolic Blood Pressure	92.38	0.74	94.53	0.85	2.15	0.770	14	10.82*

\*Significant at 5%,  $t > 2.145$

### Results

In table 3 significant differences between pre-test and post-test mean scores of controlled group on systolic blood pressure have been presented. There has been noticeable increase observed in diastolic blood pressure means from 92.38 to 94.89. In systolic blood pressure also there has been a slight elevation from 155.6 in pre test to a post test mean value of 156.88. T values of SBP and DBP comes out to be 5.60 and 10.82 respectively. All these t-values are more than the table value of  $t=2.145$  required to be significant at five percent level.

### Discussion

As per the table 3 the statistical significant difference between pre-test and post-test mean scores of controlled group may be attributed to the various factors which are beyond the control of researcher. It is due to fluctuation of the sampling. From the results of pre-test and post-test of control group it is clearly evident that control group of the subjects had improved significantly all the variables namely systolic blood pressure, diastolic blood pressure.

### Section II

This section deals with the analysis of variance (ANCOVA) applied on all the selected groups. Scheffe's post hoc test is also applied to find out which of three paired means differed significantly. This section is further sub-divided into three sub-sections i.e. Section II (a), Section II (b) and Section II(c).

#### Section II (a)

In this section the comparative results of pre-test and post-test mean scores of middle aged women of selected groups on systolic, diastolic Blood Pressure are presented from tables 4 & 5. The scheffe's post hoc test is further applied and the results have been presented from tables 4(a) to 7(a).



**Table 4, Analysis of Co Variance for the Pre-Test, Post Test and Adjusted Post-Test Data on Systolic Blood Pressure of Yogic Group, Diet Modification Group and Control Group**

Test		Yogic Asana Group N=15	Diet Modification Group N=15	Control Group N=15	Source of Variance	DF	Sum of squares	Mean Square	F-value	Sig.
<b>Pre-Test</b>	Mean	167.19	168.18	168.35	B.G	2	11.819	5.910	0.130*	0.87
	SD	7.24	7.35	5.45	W.G	42	1909.55	45.46		
<b>Post-Test</b>	Mean	149.38	164.14	169.70	B.G	2	3309.47	1654.73	36.34*	0.00
	SD	6.73	7.44	5.98	W.G	42	1912.22	45.52		
<b>Adjusted Post-Test</b>	Mean	143.13	159.40	171.11	B.G	2	5921.44	2960.72	67.02*	0.00
	SD	7.41	7.30	4.90	W.G	42	1855.27	44.17		

\*Significant at 5%,  $f > 0.05$

### Results

Table 4 shows the significant of difference among the pre-test, post-test and Adjusted Post means scores of all the selected groups of systemic hypertensive middle aged women. On systolic blood pressure the pre-test mean scores of middle aged women of yogic asana group, diet modification group and controlled group are 167.19, 168.18 and 168.35 respectively. The obtained F-value is 0.130 for pre-test which is more than the table value of  $F = 0.05$ , required to be significant at the five percent level.

The post-test mean scores of yogic asana group are 149.38, diet modification group is 164.14 and controlled group is 169.70. The inferred F-value is 36.34 for the post test which is more than the table value of  $F = 0.05$ , required to be significant at five percent level.

The adjusted post-test mean scores of yogic asana group, diet modification group and controlled group are 143.13, 159.40 and 171.11 respectively. The resultant F-value is 67.02 for post-test which is more than the table value of  $F = 0.05$ , required to be significant at five percent level.

From the above inter-relation and analysis it is quite clear that there is statistically significant difference among the post-test mean scores of yogic asana, diet modification and controlled groups. Further to determine the actual mean again in the adjusted post-test mean scores and to see that which of the three paired mean has significant difference the Scheffe's post hoc test is applied. The results are presented in table 4(a).

**Table 4(A), Scheffe's Test for the Differences Among the Adjusted Post-Test Means of Middle-Aged Women of Selected Groups on Systolic Blood Pressure**

Yogic Group	Diet Modification Group	Controlled Group	Mean differences	Confidence of Interval	
				Lower Bound	Upper Bound
143.13	159.40	----	16.26*	22.42	10.11
143.13	----	171.11	27.97*	34.13	21.81
----	159.40	171.11	11.70*	17.86	5.54

\*Significant at .05 level.

Table 4(a) shows that adjusted post-test mean difference between the yogic group and diet modification group is (16.26), and between yogic group and controlled group is ( 27.97) whereas between diet modification group and controlled group is (11.70). The value of the yogic group and diet modification group is (16.26) lies between the confidence of interval value [22.42, 10.11], the value of yogic group and controlled group is [27.97] lies between [34.13, 21.81] and the value of diet modification and controlled group is (11.70) lies between [17.86, 5.54] which shows statistically significant difference



between all the groups on systolic blood pressure as far as systemic hypertension is concerned. Whereas, in Yogic group the mean difference is greater than critical value of the confidence of interval.

**Table 5, Analysis of Co Variance for the Pre-Test, Post Test and Adjusted Post-Test Data on Diastolic Blood Pressure of Yogic Group, Diet Modification Group and Control Group**

Test		Yogic Asanas N=15	Diet Modification Group N=15	Control Group N=15	Source of Variance	DF	Sum of squares	Mean Square	F-value	Sig.
Pre-Test	Mean	98.34	98.09	98.59	B.G	2	1.90	0.95	0.050	0.95
	SD	5.10	3.16	4.56	W.G	42	796.59	18.96		
Post-Test	Mean	85.71	95.90	99.34	B.G	2	1508.68	754.34	55.50*	0.00
	SD	4.00	3.42	3.61	W.G	42	570.77	13.590		
Adjusted Post-Test	Mean	82.59	92.82	100.12	B.G	2	2324.73	1162.36	84.84*	0.00
	SD	3.69	4.18	3.14	W.G	42	575.38	13.70		

\*Significant at 5%,  $f > 0.05$

### Results

Table 5 shows the significant of difference among the pre-test, post test and adjusted post-test means scores of all the selected groups of systemic hypertensive middle aged women. On diastolic blood pressure the pre-test mean scores of middle aged women of yogic asana group, diet modification group and controlled group are 98.34, 98.09 and 98.59 respectively. The obtained F-value is 0.050 for pre-test which is less than the table value of  $F = 0.05$ , required to be significant at the five percent level.

The post-test mean scores of yogic asana group is 85.71, diet modification group is 95.90 and controlled group is 99.34. The inferred F-value is 55.50 for the mid test which is more than the table value of  $F = 0.05$ , required to be significant at five percent level.

The adjusted post-test mean scores of yogic asana group, diet modification group and controlled group are 82.59, 92.82 and 100.12 respectively. The resultant F-value is 84.84 for post-test which is more than the table value of  $F = 0.05$ , required to be significant at five percent level.

From the above interpretation and analysis it is quite clear that there is statistically significant difference among the post-test mean scores of yogic asana, diet modification and controlled groups. Further to determine the actual mean again in the adjusted post-test mean scores and to see that which of the three paired mean has significant difference the Scheffe's post hoc test is applied. The results are presented in table 5(a).

**Table 5(A), Scheffe's Test for the Differences among the Adjusted Post-Test Means of Middle-Aged Women of Selected Groups on Diastolic Blood Pressure**

Yogic Group	Diet Modification Group	Controlled Group	Mean differences	Confidence of Interval	
				Lower Bound	Upper Bound
82.59	92.82	----	10.23*	13.65*	6.80
82.59	----	100.12	17.52*	20.95*	14.09
----	92.82	100.12	7.29*	10.72*	3.86

\*Significant at .05 level.

Table 5(a) shows that adjusted post-test mean difference between the yogic group and diet modification group is (10.23), and between yogic group and controlled group is (17.52) whereas between diet modification group and controlled group is (7.29). The value of the yogic group and diet modification group is (10.23) lies between the confidence of interval value [13.65, 6.80], the value of yogic group and controlled group is [17.52] lies between [20.95, 14.09] and the value of diet



modification and controlled group is (7.29) lies between [10.72, 3.86] which shows statistically significant difference between all the groups on diastolic blood pressure as far as systemic hypertension is concerned. Whereas, in Yogic group the mean difference is greater than critical value of the confidence of interval.

### Conclusion

From the results of present study it is concluded that both yogic practices as well as dietary modifications produced a remarkable reduction in over all blood pressure. Yoga practice is consistent with Indian cultural philosophy, and data analysis indicates that practicing asana and naturopathic diet for 8 weeks reduces stress blood pressure systolic and diastolic. This is an important finding because blood pressure increases morbidity and mortality in this group. Further studies should focus on severe hypertension cases. Combining medicine and yoga or other nonpharmacologic therapies such as natural diet on the basis of the individual's preference is indicated to reduce drug use and more appropriately control BP. It is suggested that future studies can be conducted on the use of yoga on other populations with stress-related health problems.

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