

# Effect of Modest Weight loss in normalizing Blood Pressure in Essential Hypertensive Patients joining Naturopathy Centers



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### Abstract

**Objective:** To assess the effect of naturopathic lifestyle intervention integrated with various non pharmacological approaches in normalizing /controlling blood pressure levels in hypertensive patients. **Methods:** In this prospective observational study sixty hypertensives (30 hypertensive male and equal number of female) were selected from naturopathy centers namely *Prakritik Jeevan Kendra, Pattikalyana, G.T. Road, Panipat and Navneet Prabhakar Yog Chikitsa Dham, Bassi, Jaipur, Rajasthan*. These patients have undergone one month of naturopathy center life style intervention. Weight, height as well as BMI, WHR, blood pressure and nutrient intake was calculated before and after getting the treatment from naturopathy center. In naturopathy center patient were adopting a number of non pharmacological approaches like meditation, yoga, sun, air water and mud therapy and hypo caloric diet intake. **Results :** Systolic blood pressure decreased by 37.42 mm Hg and Diastolic blood pressure decreased by 21.23 mm Hg. Although the reduction in Blood pressure was Significant in first half (15 days) of the study and non significant blood pressure change was observed in later half (15 to 30 days) of the study. Moreover, a synchronized significant weight reduction ( $P \geq 0.01$ ) was observed in all observation groups (male 8.79 ;female 10.84 per cent ). The number of patients in under weight category of BMI got doubled (i.e. from 6.6 to 13.33 per cent ) ,reduction in BMI was from 25.16 to 22.95 in male and 28.07 to 25.065 in female. Percentage reduction as compare to RDA of carbohydrate, energy, protein and fat intake in male subjects was 39.3, 27.11, 46.24, 177.27 per cent. Corresponding values for female were 28.41, 40.46, 39.98, 137.71 per cent. Contrary to the intake of carbohydrate , energy and fat , Vitamin C intake increased by six folds, Vitamin A turned twice ,iron intake too raised in both male and female subjects . Consumption of hypocaloric diet synergized with the healthy food decreased the incidence of obesity, WHR and BMI to a significant extent ( $P \geq 0.01$ ) .As a result the reduction in blood pressure was obvious. **Conclusion:** Naturopathy center's lifestyle interventions are useful for all essential hypertensive patients joining these centers. Among all of them a modest weight loss is adequate to control the blood pressure levels avoiding the aggressive use of multiple anti hypertensive drugs.

**Keywords:** Naturopathy, Carbohydrate, Hypertensive, Blood Pressure  
**Introduction**

Obesity related hypertension is a distinct phenotype in view of its complex pathophysiology that involves adipose tissue dysfunction, adipokine alterations, insulin resistance, abnormal renal and vascular function (De Marco et al, 2014).

### Review of Literature

Hypertension is estimated to contribute 9.4 million deaths each year worldwide (Verma et al, 2018). About 80 per cent of hypertensive patients have one or more risk factors like dyslipidemia, glucose intolerance, obesity and ventricular hypertrophy (Flamingham, 2006). According to Joint National Committee VII criteria the prevalence of hypertension and pre-hypertension was 27.7 and 56.3 per cent, respectively and this increases with the age (WHO, 2006). Hypertension may be cropped up as a result of sedentary life style and obesity

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(WHO, 2016), excessive alcoholism, smoking, overeating and fast pace of tension loaded life. Normally changes in life is the golden rule in the prevention and even cure of such ailments. Naturopathy completely and successfully encompasses all these factors i. e., it attacks all culprits responsible for hypertension. All these life style changes result in altering the anthropometric status and these alterations contribute in controlling blood pressure (Beneit et al,2015). Moreover, Gilardini (2016) reported the role of weight loss in normalizing blood pressure. Similarly anthropometric parameters like BMI and WHR are also associated with blood pressure (Mankar and Wakode, 2018).

The most conspicuous changes of joining naturopathy centers include hypocaloric diet and exercise, these are the factors prominently capable to reduce the anthropometric status of the patients as well as Davidson considers naturopathy responsible for removal of ill health altogether by living according to the laws of nature. In India, various naturopathy centers have been set up for treating the patients suffering from hypertension and heart related diseases. Therefore, The present study has been taken with the objective to assess and analyse the adequacy of diet prescribed by naturopathy centres to the diet consumed at house hold level. Moreover its impact on the health and nutritional status of hypertensive patients enrolled in naturopathy centers was also interpreted. The patients to whom were recommended a treatment of one month were selected for the purpose of study.

#### Materials and Methods

##### Sampling

By purposive sampling technique, 30 hypertensive male and equal number of hypertensive female who enrolled themselves in naturopathy centers for The treatment of hypertension

##### Location

Subjects were selected from naturopathy centers namely -Prakritik Jeevan Kendra, Pattikalyana, G.T. Road, Panipat and Navneet Prabhakar Yog Chikitsa Dham, Bassi, Jaipur, Rajasthan. The age of the subjects was between 40-60 years. This treatment was done in naturopathy centers for one month In naturopathy centers subjects were doing yoga (i.e.exercise and pranayam). Along with this they were under going mud, water and diet therapies accordingly. They were given herbal tea, honey amla water or bottle guard juice to drink in fasting state according to their adjacent complications.

##### 2.3 Dietary Survey

Meal pattern and intake of each subject as before and after attending the naturopathy center for one month for treatment was established by 24 hr recall method for three consecutive days. Total amount of raw & cooked food in the family was also noted during this duration. Based on the above data, the amount of raw food consumed by each subject was calculated as follows:

# Periodic Research

Amount of raw food consumed by individual =  

$$\frac{\text{Total quantity of raw Individual food used by family}}{\text{Total quantity of cooked food}} \times \text{Individual intake of cooked portion}$$
  
 Their nutrient intake was compared with Recommended Dietary allowances given in the value of Indian Foods (Gopalan,2002).

#### Food Intake

Plenty of seasonal fruits and controlled fluid intake was recommended. They took bottle guard juice in fasting state and then herbal tea after 2 hours of it. They were provided cow milk once a day.

#### Anthropometry

Height, weight, waist and hip circumference of each subject was measured by using the method of Jelliffe(1966) before and after naturopathic treatment.. BMI and WHR were calculated before and after the treatment of each subject by using the method of James et al (1988) and Wardlaw et al (1992) , respectively as follows :

$$\text{BMI} = \frac{\text{Weight (kg)}}{(\text{Height in meters})^2}$$

$$\text{WHR} = \frac{\text{Waist in Cm}}{\text{Hip in Cm}}$$

The subjects were graded as per normal values and standardized tables.

#### Statistical Analysis

Data for height,weight,BMI,WHR and lipid profile was statistically analysed to calculate the mean, S.D. and paired t test was used for difference of significance.

#### Results and Discussion

##### Anthropometry

At the time of joining naturopathy centre all anthropometric parameters were above the ICMR standards.

##### Body Weight

Mean weight of the male and female subjects was 71.29 and 67.029 kg at the time of joining naturopathy centre which decreased to 65.03 and 59.76 kg respectively , after joining naturopathy centers (table 1).

##### BMI

Mean BMI was 25.16 and 28.07 at the time of joining naturopathy centre. Analysis of data further reveal that before joining the naturopathy center maximum subjects were at the risk of obesity and were the obese of 1category (male 30% ; female 19.8%) and category 2 obese(male 13.2 % ; female 6.6 %).Overall subjects having below normal BMI(<18.5) were 6.6 per cent and only 16.6 percent subjects were falling under normal BMI range(18.5 to 22.9)Before naturopathy centers diet intake, the mean value of BMI in the essential hypertensive observation group of male, female and total was 25.16±3.95, 28.07±5.92 and 26.74± 5.22 kg/m<sup>2</sup> respectively which declined to 23.66±3.72, 26.16±5.05 and 25.02±4.58 kg/m<sup>2</sup> after 15 days and further went down to 22.95±3.60, 25.07±4.68 and 24.10±4.28 kg/m<sup>2</sup>, respectively after 30 days of naturopathic diet intake (table 2).

## WHR

Table 3 reveals that prior to admission at naturopathy centers the WHR of male and female were  $1.04 \pm 0.07$  and  $0.94 \pm 0.09$ , respectively which decreased to  $1.01 \pm 0.06$  and  $0.91 \pm 0.08$  after 15 days to  $0.99 \pm 0.05$  and  $0.90 \pm 0.07$  after 30 days. The reduction in both the anthropometric parameters was significant at both levels ( $P \geq 0.01$ ) at all points of the study. However, A major chunk of subjects who were the victim of obesity, reported to have a feeling of fitness after joining naturopathy center. The subjects having below normal weight were increased from 6.6 to 13.33 per cent, which is beneficial for better blood pressure control. Initially 16.6 percent were under the normal BMI category (i.e. 18.5-24.9), which increased up to 23.32 percent after one month of treatment. This is due to summative effect of vegetarian diet, yogasana and pranayam. Hence naturopathic treatment was found effective in reducing the BMI of obese subjects.

## Nutrient Intake

Calculated nutrient intake in the table 4 reveals that Before attending naturopathy center mean energy (kcal), protein(gm), calcium(mg), iron(mg),  $\beta$  carotene(mg), vitamin C(mg), carbohydrate(gm), fiber(gm), fat(gm), sodium(mg), potassium(mg) intake was 1346.97, 64.79, 281.02, 13.06, 1243.44, 44.88, 255.62, 9.08, 40.54, 1370, 1354 in female and corresponding intake in male subjects was 1576.83, 72.96, 678.33, 16.52, 1435.2, 66.134, 221.44, 10.48, 49.05, 1420, 1401. The mean intake of energy, carbohydrate, fat and vitamin C was more than RDA and protein, fiber, vitamin A, iron, sodium and potassium was below RDA before attending naturopathy center. However during treatment in naturopathy center the intake of food condensed in energy were reduced but fruits and vegetable intake by both male and female has increased the vitamin C intake by six folds. Calcium intake is below RDA for female subjects and above RDA for male subjects but was above required level at naturopathy center. Although iron intake has increased considerably but still below RDA, supported by high vitamin C in the diet of all subjects enhanced the haemoglobin level in all subjects. Due to amplified intake of antioxidant nutrients like vitamin C, fiber,  $\beta$  carotene hypocholesterolemic effect was evident from the collected data. Fiber intake was increased nearly twice.

## Blood Pressure

Table 5 depicts that before commencing the naturopathic diet consumption, mean level of SBP in observation groups of essential hypertensive male, female and grand total populations comprised with both male and female subjects were  $157.20 \pm 19.86$ ,  $166.99 \pm 23.83$  and  $162.51 \pm 22.27$  mm Hg, respectively. Which turned  $130.06 \pm 8.32$ ,  $124.79 \pm 6.06$  and  $127.20 \pm 7.58$  mm Hg after 15 days and  $124.56 \pm 5.05$ ,  $125.53 \pm 6.57$  and  $125.09 \pm 5.84$  mm Hg respectively after 30 days. The reduction in SBP was significant ( $P \geq 0.01$ ) at various time intervals of the study for all observation groups but was non significant at 15 to 30 days time period for female essential hypertensive subjects.

Prior to admission in the naturopathy centers the level of DBP in groups of male, female and grand total population of both were  $106.29 \pm 15.20$ ,  $104.81 \pm 11.62$  and  $105.49 \pm 13.25$  mm Hg, respectively. On naturopathy centers diet feeding the mean DBP of the male, female and overall population constituted with both male and female subjects reduced to  $94.50 \pm 15.20$ ,  $86.05 \pm 6.06$  and  $89.91 \pm 18.44$  mm Hg after 15 days and  $85.06 \pm 5.72$ ,  $83.58 \pm 4.32$  and  $84.26 \pm 5.01$  mm Hg, respectively after 30 days. The decline in DBP was significant at both levels ( $P \geq 0.01$ ) at all observation points for all the observation groups except a non significant decline for male hypertensive subgroup after initial 15 days of joining naturopathy centers. However, the reduction in blood pressure was significant among all hypertension observation subgroups after complete 30 days of naturopathic diet follow up. Edla *et al* (2016) too proved the efficacy of yoga and naturopathy integrative approach in reduction of blood pressure in a three month cohort study.

## Conclusion

Present study advocates that exercise and food therapy in naturopathy center treatment is a reliable tool to bring about significant weight reduction and thus contribute in remarkable blood pressure control. This is made feasible with the help of integrated yoga, meditation and diet control by changing their food habits and incorporation of healthful food stuffs in their dietary resume, sufficient to normalize blood pressure and reduce the burden of strong antihypertensive drugs responsible for numerous side effects.

**Table 1: Mean ( $\pm$ S.D.) Anthropometric Parameters of the Hypertensive Human Subjects at joining (A), after 15 days (B) and after 30 days (C) of Naturopathic Treatment**

Parameters	Mean $\pm$ S.D. values at different time periods			Statistical interpretation					
	A	B	C	A v/s B		B v/s C		A v/s C	
	At joining	After 15 days	After 30 days	t value	%=A- B/A x 100	t value	%=B-C/B x 100	t value	%=A- C/A x 100
<b>Height (m)</b>									
Male (n=30)	1.68 $\pm$ .06	--	--	--	--	--	--	--	--
Female (n=30)	1.54 $\pm$ .09	--	--	--	--	--	--	--	--
Total (N=60)	1.60 $\pm$ 0.10	--	--	--	--	--	--	--	--
<b>Weight(kg)</b>									
Male (n=30)	71.30 $\pm$ 12.76	67.99 $\pm$ 11.84	65.03 $\pm$ 11.64	15.48**	6.00	13.94**	2.97	21.63**	8.80
Female (n=30)	67.03 $\pm$ 18.72	62.39 $\pm$ 16.24	59.76 $\pm$ 15.22	7.33**	6.91	9.29**	4.22	8.19**	10.84
Total (N=60)	68.98 $\pm$ 16.09	64.51 $\pm$ 14.32	62.17 $\pm$ 13.71	12.35**	6.48	13.48**	3.63	13.61**	9.88
<b>BMI (Kg/m<sup>2</sup>)</b>									
Male (n=30)	25.16 $\pm$ 3.95	23.66 $\pm$ 3.72	22.95 $\pm$ 3.60	19.52**	5.97	12.80**	3.01	24.67**	8.80
Female (n=30)	28.07 $\pm$ 5.22	26.16 $\pm$ 5.05	25.07 $\pm$ 4.68	8.17**	6.79	10.07**	4.19	9.16**	10.70
Total (N=60)	26.74 $\pm$ 5.22	25.02 $\pm$ 4.58	24.10 $\pm$ 4.28	12.82**	6.44	12.87**	3.68	13.72**	9.88
<b>WHR</b>									
Male (n=30)	1.04 $\pm$ 0.074	1.01 $\pm$ 0.06	0.10 $\pm$ 0.06	7.60**	2.95	7.08**	1.60	8.60**	4.50
Female (n=30)	0.94 $\pm$ 0.09	0.91 $\pm$ 0.80	0.90 $\pm$ 0.07	13.04**	3.52	6.24**	1.47	10.73**	10.70
Total (N=60)	0.99 $\pm$ 0.09	0.95 $\pm$ 0.09	0.94 $\pm$ 0.08	14.07**	3.24	9.40**	1.54	13.83**	4.73

NS - Non significant value  
 \* - Significant value at 5% ( $P \geq 0.05$ ) level of significance as tested by paired t test.  
 \*\* - Significant value at 1% ( $P \geq 0.01$ ) level of significance as tested by paired t test.  
 A v/s B, B v/s C, A v/s - Difference with in the group with respect to time, on the basis of paired t test.  
 % - Percent change derived by using the formula; final value/ initial value X 100

**Table 2: Categorization of Male and Female Obese Subjects Studied As Per BMI (Wt./ H<sup>2</sup>) Before, During And After Joining Naturopathy Centers**

Classification	Category	Female (n=30)			Male (n=30)			Total (N=60)		
		A	B	C	A	B	C	A	B	C
Underweight	<18.5	2 (6.6)	4 (13.2)	4 (13.2)	2 (6.6)	3 (9.99)	4 (13.2)	4 (6.66)	7 (23.31)	8 (13.33)
<b>Normal</b>	18.5-22.9	6 (19.8)	10 (33.33)	12 (39.6)	4 (13.2)	3 (9.99)	2 (6.66)	10 (16.66)	13 (43.29)	14 (23.32)
<b>At risk of obesity</b>	23-24.9	9 (30)	3 (9.99)	6 (19.8)	2 (6.6)	5 (16.66)	8 (26.4)	11 (18.33)	8 (26.64)	14 (23.32)
Obese 1	25-29.9	9 (30)	10 (33.33)	6(19.8)	12 (39.6)	10 (33.33)	8 (26.4)	21 (35.00)	20 (33.33)	14 (23.32)
<b>Obese 2</b>	$\geq$ 30.0	4 (13.2)	3 (9.99)	2 (6.6)	10 (33.3)	9 (30)	8 (26.4)	14 (23.32)	12 (39.96)	10 (16.66)

# Figure in parenthesis indicate percentage  
 A - Before joining naturopathy center  
 B - 15 days after joining naturopathy center  
 C - 30 days after joining naturopathy center

**Table 3: Categorization of Male and Female Obese Subjects Studied as Per WHR Before, During And After Joining Naturopathy Centers**

Category	Male (n=30)			Category	Female (n=30)		
	A	B	C		A	B	C
.1<	23( 76.59)	17( 56.61)	15( 50)	.85<	28( 93.24)	27( 89.91)	25( 83.25)
.1>	7( 23.31)	15( 43.29)	15( 50)	.85>	2( 6.66)	3( 9.99)	5(16.65)

# Figure in parenthesis indicate percentage  
 A - Before joining naturopathy center  
 B - 15 days after joining naturopathy center  
 C - 30 days after joining naturopathy center

**Table 4: Mean nutrient intake of subjects before and during treatment at naturopathy centers**

Nutrient	At Home		At Naturopathy Center		Paired 't' test value
	Mean intake	% RDA	Mean intake	% RDA	
<b>Energy(Kcal)</b>					
Male	2621.30± 73.21	108.10	1640.29±45.54	67.64	10.33**
Female	1982.34± 84.72	105.73	1304.89 ± 49.27	69.59	9.64**
<b>Protein(gm)</b>					
Male	102.35± 13.94	61.41	33.84 ±12.38	56.40	1.78(NS)
Female	48.33± 11.23	96.66	27.45 ±10.45	54.89	2.39*
<b>Fat (gm)</b>					
Male	49.05± 5.70	245.27	13.2 ±2.75	66.00	31.33**
Female	40.54± 8.15	202.71	11.68 ±4.21	58.38	15.78**
<b>Carbohydrate(gm)</b>					
Male	361.28 ±63.12	99.32	330.56 ±14.52	82.63	2.71*
Female	281.63± 53.61	100.14	175.89± 50.86	62.53	3.29
<b>Vitamin A(mg)</b>					
Male	358.8 ±44.15	59.8	820.08 ±54.81	136.68	33.12**
Female	310.86± 35.67	51.81	817.83 ± 75.17	136.30	27.46**
<b>Vitamin C(mg)</b>					
Male	66.13 ±17.73	165.34	289.70 ±4.92	724.25	33.66**
Female	44.88 ±13.52	112.19	288.51± 38.77	721.28	31.82**
<b>Calcium (mg)</b>					
Male	678.33 ±50.21	164.58	578.75 ±43.29	144.69	2.09*
Female	281.02 ± 65.14	70.26	566.56 ± 58.42	141.64	8.23**
<b>Iron(mg)</b>					
Male	16.52 ±6.13	59.01	27.11 ±8.31	96.82	32.75**
Female	13.06 ± 4.45	43.53	23.97 ±5.48	79.80	11.94**
<b>Fiber (gm)</b>					
Male	10.48 ±7.14	26.20	52.82±10.25	132.06	20.05**
Female	9.08 ± 4.34	22.7	54.05± 17.12	135.11	18.91**
<b>Sodium(mg)</b>					
Male	1419.99 ±100.21	43.03	430.73 ±20.35	13.05	15.78**
Female	1370.49 ±92.71	41.53	424.64 ±32.18	12.87	5.49**
<b>Potassium</b>					
Male	1400.85 ±114.21	42.45	2132.64 ±300	64.63	3.42**
Female	1353.99 ±123.22	41.03	2102.95 ±280.736	3.73	7.56**

NS - Non significant value  
 \* - Significant value at 5% (P ≥ 0.05) level of significance as tested by paired t test.  
 \*\* - Significant value at 1% (P ≥ 0.01) level of significance as tested by paired t test.

**Table 5: Physiological Parameters of The Hypertensive Human Subjects at Joining (A), after 15 days (B) and after 30 days (C) of Naturopathic Treatment**

Parameters	Mean ± S.D. values at different time periods			Statistical interpretation					
	A At joining	B After 15 days	C After 30 days	A v/s B		B v/s C		A v/s C	
				t value	%=A-B/A x 100	t value	%=B-C/B x 100	t value	%=A-C/A x 100
<b>SBP (mmHg) (Systolic Blood Pressure)</b>									
Male (n=30)	157.20± 19.86	130.06± 8.32	124.56± 5.05	6.41**	17.26	3.40**	4.23	8.07**	20.76
Female (n=30)	166.99 ± 23.83	124.79± 6.06	125.53 ±6.57	9.26**	25.27	-0.72(NS)	-0.59	9.75**	29.73
Total (N=60)	162.51± 22.27	127.20± 7.58	125.09± 5.84	9.42**	21.73	6.24**	3.72	11.53**	23.03
<b>DBP (mmHg) (Diastolic Blood Pressure)</b>									
Male (n=30)	106.29± 15.20	94.50 ±15.20	85.06 ±5.72	1.62(NS)	11.10	3.51**	9.99	7.38**	19.97

Male (n=30)	104.81± 11.62	86.05± 6.06	83.58 ±4.32	7.91**	17.17	3.92**	6.50	11.30**	22.56
Female (n=30)	105.49± 13.25	89.91± 18.44	84.26 ±5.01	3.50**	14.76	3.46**	6.29	7.21**	20.13
Total (N=60)									

NS	-	Non significant value
*	-	Significant value at 5% ( $P \geq 0.05$ ) level of significance as tested by paired t test.
**	-	Significant value at 1% ( $P \geq 0.01$ ) level of significance as tested by paired t test.
A v/s B, B v/s C, A v/s	-	Difference with in the group with respect to time, on the basis of paired t test.
%	-	Percent change derived by using the farmula; final value/ initial value X 100

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