

ORIGINAL RESEARCH ARTICLE - CLINICAL STUDY

A clinical trial to evaluate the role of pranayama in pre-hypertension

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ABSTRACT

Introduction: In India about 23% peoples are Hypertensive while 38 % are pre- Hypertensive. Hypertension and Prehypertension is a major risk factor for the development of cardiovascular disease and cerebrovascular disease causing high rate of mortality and morbidity. Presents study throws a detailed light on preventive efficacy of pranayama in prehypertension. **Method:** The present study was undertaken to study the role of Bhramari Pranayam and Anulomviloma Pranayama on prehypertension. 34 patients of prehypertension were selected from OPD, NIA, Jaipur by random sampling for this study. The samples were divided in two groups, Group-A for Anulomviloma Pranayama and group-B for Bhramari Pranayama. The Pranayamas were practiced by the subjects every day for two months. The Lipid profiles and blood pressures were compared one day prior and one day after experimental period. **Results:** On statistical analysis, Anulomviloma and Bhramari Pranayama were found to have significant favorable effect on blood pressure and lipid profile. **Conclusion:** On the basis of the various observations and results obtained after completion of the current research study, it can be concluded that, Bhramari pranayama and Anoloma-viloma pranayama may be used in the prevention of hypertension in prehypertensive phase. On symptomatic analysis and percentage wise analysis in some symptoms, better results were observed in Group-B by Bibhitaka gutika. So it is concluded that Bibhitaka gutika is more effective than Pathyadi gutika in management of Tamakashvasa.

Keywords : Prehypertension, Anulomviloma and Bhramari Pranayama**Address for Correspondence:****Dr. Shantanu Tiwari**

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Introduction:

Now a day, hypertension is one of the most common diseases in developing as well as developed countries. WHO states that more than one fourth of world population which is about 1 billion, is hypertensive. Hypertension is fourth contributor to premature death in developed country and seventh in developing countries. It is estimated that about 2.56 billion people are Hypertensive

by 2025. Prevalence of prehypertension is significantly higher than hypertension worldwide. In India about 23% peoples are Hypertensive while 38% are pre-hypertensive. It is more severe than the expected; because 50% of the cases remain undiagnosed hence prevalence is much more than the calculated. Prehypertension is normal healthy condition in which blood pressure ranges lower limit of the hypertensive range (blood pressure >120/80 mmHg, but <140/90 mmHg). It is detected on routine medical check-up. Prehypertension frequently evolves to hypertension (HTN) and increases cardiovascular risk. Hypertension is a major risk factor for the development of cardiovascular disease and cerebrovascular disease causing high rate of mortality and morbidity. According to allopathic system of medicine there is no cure for Hypertension. It can only be controlled by medicine. Therefore, patient is needed to depend lifelong on the oral medicine with the lots of side effects. Prevention is better than cure, so there is need to prevent the disease by arresting it in very initial stage i.e. prehypertension. Yoga is ancient Indian paradigm for harmonizing the body-mind complex. Pranayama, the important parts of yoga, improve physical, mental and spiritual health. Pranayama is inexpensive, non-pharmacological techniques without any side effects and the person can do it easily at any stage of life, with little training. Regular observance of pranayama practices may reduce the risk of hypertension in very early stage i.e. prehypertension.

Aims and Objectives

1. Commemorate the classical reference and etiopathogenesis of hypertension.
2. To evaluate the role of Bhramari Pranayama and Anuloma Viloma Pranayama in pre-hypertension.

Material and Method

Research Design: Open Randomized Clinical Trial

Selection of Cases: 34 patients were selected randomly from OPD & IPD, National Institute of Ayurveda, Jaipur, which had raised blood pressure in pre-hypertensive range as per 7th JNC & WHO criteria for Diagnosis Hypertension (above 120/80 and below 140/90). Daily reading of BP

are taken in consecutive for 7 days after rest of 15 min and average are utilized for diagnosing pre-hypertension. The cases were randomly selected regardless of their age, sex, and socio-economic consideration.

Inclusion Criteria

1. Age between 18 to 45 years.
2. Blood pressure: Systolic- 130 to 139 mm Hg and Diastolic-80 to 89 mm Hg.

Exclusion Criteria

1. Diagnosed case of Hypertension or takes any antihypertensive medication.
2. Patient having any other associated systemic disorder are excluded.

Grouping and Intervention of Pranayama

Sample size: 34 patients

Group A- 17 well diagnosed patients of prehypertension were intervened by anuloma-viloma pranayama started with 3-5 rounds which has been increased for 15 to 20 minutes as per stamina for 15 to 20 minutes.

Group B- 17 well diagnosed patient of prehypertension was intervened by bhramari pranayama for minimum 3 to 5 rounds.

Trial period- 60 days

Criteria of Assessment

Objective Parameter

1. Blood pressure (a) Systolic (b) Diastolic
2. Pulse Pressure
3. Pulse Rate
4. Respiratory rate
5. Lipid profile

All investigations are done before and after study period.

Method of Study:

Thirty four patients were selected for this study. They were interviewed and investigated using a specific proforma to obtain information about the disease and

collect the different data for the study. These patients have been divided randomly into two groups based on the type of therapy given: Group A - Anulom-vilom pranayama and Group B - Bhramari pranayama.

Patients were studied up to three follow-ups at the interval of 15 days each. Out of 34 patients, 2 patient of group A and 2 patient of group B were irregular to their follow-ups, so they were discarded from the present study. Final assessment of results was done only in 30 patients of prehypertension.

Statistical Methods:

All the data were collected in tabulated form and shown in graphic representation also. The intra-group comparison was done to see the effect of treatment using 'paired t-test' test for symptoms and other investigations. The effect of yogic practices was seen by inter-group comparison between group A and B using the unpaired t test. Probably score was fixed at 5% level.

Ethical Clearance: This work has been approved by institutional Ethical Committee of National Institute of Ayurveda, Jaipur, No.IEC/ACA/2015/115 dated 21.05.2015.

Results

Objective Parameters

1) Pulse Rate: Before trial, mean value was 79.123 in Group B, 82.856 in Group A, and after treatment it was reduced to 74.437 in Group B, 75.673 in Group A. The percentage of improvement was 5.63% in Group B and 3.8% in Group A. Statistically, Group -B is extremely significant ($p < 0.0001$) while Group -A is very significant ($p, 0.0031$)

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.1822 considered not significant.

2) Systolic Blood Pressure (mm Hg): Measured in all cases before trial had a mean of 132.86 in Group B, 131.14 in Group A, and after treatment it was reduced to 126.97 in Group B, 125.04 in Group A. The percentage of improvement was 4.43% in Group B and 3.9% in Group A. statistically, both are very significant with p value

0.0035 for group B and 0.0042 for group A.

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.415 considered not significant.

3) Diastolic BP (mm Hg): Before trial, mean value was 86.395 in Group B, 86.418 in Group A, and after treatment it was reduced to 83.046 in Group B, 83.351 in Group A. The percentage of improvement was 3.83% in Group B and 3.54% in Group A. statistically, Group B is extremely significant with $p = 0.0007$ and Group A is very significant with $p = 0.0015$.

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.999 considered not significant.

4) S. Cholesterol (mg/dl): Before trial, mean value was 183 in Group B, 182.33 in Group A, and after treatment it was reduced to 172.07 in Group B, 175.47 in Group A. The percentage of improvement was 5.9% in Group B and 3.76% in Group A. statistically, both are very significant ($p < 0.001$).

Inter-group comparison: applying Unpaired 't' test the two-tailed P-value is 0.1924 considered not significant.

5) S. Triglyceride (mg/dl): Before trial, mean value was 134.6 in Group B, 142.2 in Group A, and after treatment it was reduced to 123.1 in Group B, 133.9 in Group A. The percentage of improvement was 8.5% in Group B, which are statistically extremely significant ($p < 0.0001$) and 5.8% in Group A, which are statistically very significant ($p < 0.001$).

Inter-group comparison: Applying Unpaired 't'-test the two-tailed P value is 0.363 considered not significant.

6) HDL (mg/dl): Before trial, mean value was 48.33 in Group B, 48.2 in Group A, and after treatment it was raised to 52.067 in Group B, 51.067 in Group A. The percentage of improvement was 7.7% in Group B which are statistically very significant ($p < 0.001$) and 5.9% in Group A. statistically which are statistically significant ($p < 0.01$).

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.3732 considered not significant.

7) LDL (mg/dl): Before trial, mean value was 107.63 in

Group B, 105.69 in Group A, and after treatment it was reduced to 97.73 in Group B, 101.43 in Group A. The percentage of improvement was 9.19% in Group B which is statistically very significant ($p < 0.001$) and 4.03% in Group A statistically, which is significant ($p < 0.01$).

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.11 considered not significant.

8) VLDL (mg/dl): Before trial, mean value was 26.92

in Group B, 27.92 in Group A, and after treatment it was reduced to 24.69 in Group B, 25.60 in Group A. The reduced percentage was 8.4% in Group B, which is statistically significant ($p < 0.001$), and 8.3% in Group A, which is statistically significant ($p < 0.001$).

Inter-group comparison: Applying Unpaired 't' test the two-tailed P value is 0.99 considered not quite significant.

Table I: Effect of Therapy on Objective Parameters

S.N	Objective parameters	% Relief	
		Group-B	Group-A
1.	Pulse Rate	5.63%	3.8%
2.	Systolic Blood Pressure	4.43%	3.9%
3.	Diastolic Blood Pressure	3.83%	3.54%
4.	S. Cholesterol	5.9%	3.7%
5.	S. Triglyceride	8.5%	5.8%
6	HDL	7.7%	5.9%
7	LDL	9.19%	4.03%
8	VLDL	8.4%	8.3%

Table II: Inter & intra-group for objective parameters

Variables	Group – B		Group – A		Intra-group comparison between BT & AT (Paired t test)		t value on difference of BT & AT (Unpaired t test)
	BT(n=15) Mean±SD	AT(n=15) Mean±SD	BT(n=15) Mean±SD	AT(n=15) Mean±SD	Group-B Mean±SD	Group-A Mean±SD	
Pulse Rate	83.12±5.09	78.43±4.41	83.86±5.93	79.63±5.117	4.69±3.64 t = 4.981 (P<0.001)*	3.18±3.45 t = 3.572 (P<0.01)*	t = 1.368 P>0.1
Systolic Blood Pressure	132.86±4.96	126.97±6.19	131.14±4.56	125.94±6.03	5.89±6.52 t = 3.449 (P>0.001)	5.2±5.90 t = 3.413 (P>0.001)	t = 0.827 P>0.1
Diastolic Blood Pressure	86.36±2.084	83.046±2.96	86.42±2.01	83.35±2.44	3.05±2.9 t = 4.295 (P<0.001)*	3.07±3.02 t = 3.934 (P<0.001)*	t = 0.000 P>0.5

S. Cholesterol	183±21.481	172.07±22.5	182.3±20.29	175.47±21.65	10.93±11.11 t = 3.813 (P>0.001)	6.867±862 t = 3.086 (P>0.001)	t = 1.336 P>0.1
S. Triglyceride.	134.6±25.35	123.07±30.76	142.2±28.6	133.9±30.77	11.53±10.12 t = 4.41 (P<0.001)*	1.28±1.27 t = 5.01 (P>0.001)	t = 0.9251 P> 0.1
HDL	48.33±2.23	52.07±4.56	48.2±0.41	51.07±4.04	-3.73±4.61 t = 3.14 (P>0.001)	-2.87±4.05 t = 2.741 (P>0.01)	t = 0.90 P>0.1
LDL	107.63±16.64	97.73±15.65	105.69±15.35	101.43±17.39	9.88±12.05 t = 3.18 (P>0.001)	4.27±6.64 t = 2.93 (P>0.01)	t = 1.64 P>0.1
VLDL	26.92±5.07	24.69±1.60	27.92±5.36	25.6±1.87	2.03±3.48 t = 2.22 (P>0.01)	2.32±3.88 t = 2.36 (P>0.01)	t = 0.009 P> 0.1

Discussion

Discussion on disease

The term prehypertension was coined in 1939^[1]. The individuals with blood pressure >120/80 mmHg, but <140/90 mmHg was the accepted value for the lower limit of the hypertensive range later classified as prehypertension. In north India the age and sex adjusted prevalence of prehypertension was 32.3% and hypertension was 23.2%. Incidence of prehypertension was highest (36%) in the age group 30-39 yr^[2].

Following the diction of Charaka many scholars of present era have tried to correlate essential hypertension with different classical etiopathogenesis. Some of them are:

- 1) RaktagataVata - Dr. Y. N. Upadhyaya.
- 2) SiragataVata - Dr. G. N. Chaturvedi.
- 3) AvrittaVata - Dr. R. K. Sharma.
- 4) DhamaniPratichaya - Dr. A. D. Athawale.
- 5) RaktaVridhi - Dr. G. N. Chaturvedi.
- 6) RaktaVata - Dr. P. V. Sharma.

Prehypertensive is stage of sanchaya, of doshas. Nidansevan vitiates vata especially vyana vata, which further vitiates sadhaka pitta and avalambaka kapha.

All the three vitiates hridaya and manovahi srotas. On further nidana sevan this vitiated manovahi srotasa may give rise to according psychosomatic disease. Secondly, the balwati vyanavata circulate in whole body through circulatory system manifests according to kha-vaigunya created due to nidan sevana.

Hypertension the main pathogenesis occurs in Raktadhatu and Dhamani. It is considered as psychosomatic and Tridoshaja disorder with predominance of Vata dosha.

Discussion on Bhramari Pranayama

By the practicing Bhramari pranayama, buzzing sound of bee is produced and practitioner gets the pleasant feeling. In Bhramari pranayama, the ear is closed by thumb, nostrils are blocked by fingers and forehead is pressed not of vibrate with higher amplitude. When the natural frequency of vibration is equal to forced frequency then resonance will occurs. The vibration of thinking of human body can be control, it can be resonate by the Bhramari pranayama and resonance of the concentration of mind can be enhanced. Nada sound which is produced by Bhramari pranayama also activates the limbic system and release the depression. In such a way, Bhramari pranayamais effectively reduces stress and hence blood pressure.

Bhramari Pranayama techniques form an important

component of yoga. It maintains a slow rhythmic pattern of breathing using both nostrils, thus producing balancing effect on the autonomous nervous system (ANS)^[3]. Blood pressure and pulse rate are related with cardio vascular system which is controlled by ANS.

The breathing process is directly connected to the brain and CNS and it is one of the most vital processes in the body system. It also has some connection with hypothalamus which controls emotional responses. It transforms perception into cognitive experiences. Secretion of neuro-transmitter is also under its control. If we breathe erectly erratic impulses sends to this Centre and creates disturbed responses as a result the level of GABA and serotonin is decreased which results anxiety. So by becoming aware of the nature of the breath and by restraining it, the whole system becomes controlled.

By Bhramari pranayama, we are helping to balance both of these systems in relation to each other as well as balancing brain activity.^[4]

Bhramari Pranayama produces vibrations in cranium bone and cranial cavity, this process produces a type of massaging action on brain which increases blood circulation in brain by opening several channels of circulation. Hence it increases brain's potential and reduces stress.

The Bhramari Pranayama may help in reducing stress which in turn might have brought favorable changes in lipid profile. Cholesterol rises greatly with stress. Yoga relieves the stress and there by cholesterol level along with LDL, VLDL is declined while HDL level get raised ^[5].

Discussion on Anuloma-viloma

The Pranayama accompanied by breath control increases cardiac output, decreases hepatic, renal blood flow and increases cerebral peripheral vessels blood flow. Heart rate varies with single thought and thoughtless condition.^[6] Right nostril breathing activates sympathetic nervous system left activate parasympathetic. Alternate nostril breathing brings about balance in the autonomous nervous system.^[7]

The pranayama is an art of control of breathing, a

practitioner of Anuloma-viloma Pranayama not only tries to breath, but the same time, also tries to keep his/her attention on the act of breathing leading to concentration. This act concentration removes his attention from worldly worries and de-stresses him/her. This stress free state of mind evokes relaxed response in this relaxed state, parasympathetic nerve activity overrides sympathetic nerve activity. Therefore a significant decline in systolic blood pressure after Anuloma-viloma Pranayama has been seen.

Conclusion

On the basis of the various observations and results obtained after completion of the current research project, it can be concluded that the Bhramari pranayam and Anoloma-viloma pranayam may be used in the prevention of hypertension in prehypertensive phase. The clinical response in terms of improvement in blood pressure was significant Bhramari pranayam and Anoloma-viloma pranayama. The practices of pranayama are inexpensive, cost effective technique with proved efficacy and safety, and patient can practice them at home easily with a little training, so it should be incorporated in the routine to prevent hypertension by arresting it in prehypertensive phase.

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सारांश:

परिचय: भारत में 38% लोग उच्चरक्तचाप की पूर्वावस्था से जब कि 23% लोग उच्चरक्तचाप से ग्रसित हैं। उच्चरक्तचाप की पूर्वावस्था अक्सर अग्रसरित होकर उच्चरक्तचाप में परिवर्तित हो जाती है जो कि हृदय सम्बन्धित तथा मस्तिष्कघात जैसे रोगों का एक निदान है तथा यह रोग दर वृद्धि व मृत्यु का एक प्रमुख कारण है। इस अध्ययन में उच्चरक्तचाप की पूर्वावस्था में प्राणायाम के स्वास्थ्यरक्षणार्थ होने वाले प्रभावों पर प्रकाश डाला गया है। विधि: उक्त अध्ययन में अनुलोम विलोम व भ्रामरी प्राणायाम का उच्चरक्तचाप की पूर्वावस्था में प्रभाव को विषयवस्तु रूप में ग्रहण किया गया है। इस हेतु राष्ट्रीय आयुर्वेद संस्थान, बहिरंग से उच्चरक्तचाप की पूर्वावस्था के 34 आतुरों को रैंडम सैंपल विधि से चुना गया। इन्हें दो समूहों A एवं B में विभक्त किया गया। समूह A को अनुलोम विलोम व समूह B को भ्रामरी प्राणायाम का अभ्यास प्रतिदिन 60 दिनों तक कराया गया। सभी का प्रथम व अन्तिम दिन के अगले दिन लिपिड प्रोफाइल एवं रक्तदाब का तुलनात्मक विश्लेषण किया गया। परिणाम: सांख्यिकीय विश्लेषण के बाद यह पाया गया कि अनुलोम विलोम व भ्रामरी प्राणायाम का लिपिड प्रोफाइल एवं रक्तदाब पर अनुकूल प्रभाव है। निष्कर्ष: उपरोक्त अनुसंधानात्मक अध्ययन व प्राप्त परिणाम के अनुसार यह निष्कर्ष है कि अनुलोम विलोम व भ्रामरी प्राणायाम का उपयोग उच्चरक्तचाप की पूर्वावस्था में ही उच्चरक्तचाप की रोकथाम हेतु प्रयोग करना चाहिये।