

The Effect of Anulom Vilom on Cardiovascular Variables of Hypertensive Patients

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ABSTRACT

Background: Yoga is the best lifestyle modification, which aims to attain the unity of mind, body and spirit through Asanas (exercises), pranayama (breathing), and meditation. Breathing exercises includes an alternate nostril breathing (ANB) which consists of slow, deep and quite breaths using one nostril at a time. Prana (energy) and Ayam (to expand or control) form the word Pranayama. So, it is a technique to control or expand the energy in the body. Hypertension is one of the most common diseases around the globe and its prevalence is rapidly increasing. Persistent hypertension results in premature death due to developing coronary heart disease, stroke and other cardiovascular disease such as heart failure. Medical treatment to cure hypertension is not always enough to control their blood pressure to target level of 140/90. Yoga the traditional practice from Indian culture has been used effectively in various health disorder issues and can be used as a supplementary medicine.

Aim and Objectives: To study the effect of ANULOM VILOM Pranayama on Cardiovascular variables in hypertensive patients.

Method: 20 hypertensive subjects of 40-70 years age group, fulfilling the inclusion and exclusion criteria underwent 15 mins of ANULOM VILOM Pranayama daily for 4 weeks. Pre and post pranayama cardiovascular variables were assessed by recording systolic blood pressure, diastolic blood pressure and heart rate.

Result: There was significant reduction in systolic blood pressure, diastolic blood pressure

and heart rate after practicing pranayama for 4 weeks.

Conclusion: The present study concluded that the regular practice of ANULOM VILOM Pranayama for 4 weeks reduces the cardiovascular parameters in hypertensive patients.

Keywords: Systolic blood pressure, Diastolic blood pressure, Heart rate, ANULOM VILOM, Hypertension.

INTRODUCTION

Yoga is an ancient philosophical and religious tradition thought to have originated in India in 5000 BC⁽³⁾. It has been incorporated into modern medicine during the few decades because of increasing incidence of diseases of modern civilization such as obesity, hypertension, coronary artery diseases and diabetes mellitus, which are rooted in faulty lifestyle and psychological stress⁽³⁾. Yoga is the best lifestyle modification, which aims to attain the unity of mind, body and spirit through Asanas (exercises), pranayama (breathing), and meditation⁽³⁾. Healthy lifestyles and breathing exercises help in improvement of quality of life⁽⁴⁾. Lifestyle modifications are universally accepted not only as the first step in the management of hypertension but also as a way to prevent hypertension⁽⁵⁾. Breathing exercises includes an Alternate Nostril Breathing (ANB) which consists of slow, deep and quite breaths using one nostril at a time⁽⁴⁾. Yoga draws the attention of large group of people due to its positive

effect on health⁽¹⁾. The Pranayam, which is an integral part of Yoga, energizes and balances the different systems of our body and controls the mind and other senses. Prana (energy) and Ayam (to expand or control) form the word Pranayam⁽¹⁾. So, it is a technique to control or expand the energy in the body⁽¹⁾. It is a technique to change or control the normal breathing process to make Purak (inhalation), Kumbhak (retention) and Rechak (exhalation) deep and prolong⁽¹⁾.

Hypertension is one of the most common diseases around the globe and its prevalence is rapidly increasing⁽²⁾. Hypertension is fourth most common cause of premature death due to developing coronary heart disease, stroke and other cardiovascular diseases, such as heart failure⁽²⁾. Persistent hypertension results in premature death due to developing coronary heart disease, stroke and other cardiovascular disease such as heart failure⁽²⁾. High BP is a medical condition in which the pressure of blood pushing against the blood vessels (arteries) walls is persistently high⁽²⁾. High blood pressure forces the heart to work harder to pump blood throughout the body⁽²⁾.

Medical treatment to cure hypertension is not always enough to control their blood pressure to target level of 140/90⁽²⁾. Yoga the traditional practice from Indian culture has been used effectively in various health disorder issues and can be used as a supplementary medicine⁽²⁾. Yoga has been found to be an effective adjuvant therapy for hypertension⁽⁵⁾.

LITERATURE REVIEW

1. Roopa B. Ankad, Anita Herur, Shashikala G. V., Surekharani Chinagudi conducted a study titled 'Effects of Short-Term Pranayama and Meditation on Cardiovascular Functions in Healthy Individuals'. This study took place in Karnataka India in April-June 2011; it examined healthy individuals. However, it showed that the mean resting pulse rate, mean resting systolic, diastolic and mean arterial blood pressure were reduced significantly after 15 days of yoga practice.
2. Pallavi Tiwari, JK Savalia and Agam Vajpeyi conducted a study titled 'Effect of yogic intervention on high blood pressure'. This study took place in Ahmedabad, Gujrat, India in May 2019; it examined IT workers. However, it showed that there is significant reduction in their systolic blood pressure after the yoga intervention.
3. Dandekar Pradnya Deepak conducted a study titled 'Impact of short term training of anulom vilom pranayam on blood pressure and pulse rate in healthy volunteers' at Wardha Maharashtra India in December 2012. However, it showed decline in systolic blood pressure
4. Jennifer Z. Brandani, Julio Mizuno, Emmanuel G. Ciolac, Henrique L. Monteiro conducted a study titled 'The hypotensive effect of Yoga's breathing exercises; A Systemic review at Bauru Brazil in April 2017. This study took place in Brazil. It showed significant reduction in blood pressure in normal and hypertensive patients.
5. Ananda Balayogi Bhavanani conducted a study titled 'Immediate effect of Sukha Pranayama on Cardiovascular Variables in Patients of Hypertension at Puducherry India in 2011, it examined hypertensive patients. However, it showed reduction in heart rate and blood pressure.
6. Sharma Neha Narendrabhai, Khyati Shah conducted a study titled 'Immediate effect of Anulom-Vilom Pranayama on selected cardiovascular and pulmonary parameters in post covid-19 individuals -An experimental study' at Ahemdabad, India in 2022. This study showed decrease in heart rate and increased peak expiratory flow rate after 20 min of anulom vilom pranayam.
7. Vadakkan Devassy Thomas conducted a study titled 'Effect of anulom vilom pranayama as an adjuvant treatment

modality to improve the level of dyspnea in chronic asthma patients' at Kerala, India in 2018. It showed decrease in the level of dyspnea in chronic bronchial asthma patients.

8. Sarika ML, Ajaya Ghosh in their study titled 'Effect of Pranayama on Cardiovascular Parameters among Indian Population- A narrative review at Bhubaneswar, India in 2020. It showed effect of pranayama on the cardiovascular parameters among the healthy as well as the hypertensive patients.
9. Raviteja R. Guddeti, Geetanjali Dang, Mark A. Williams, Vekata Mahesh Alla in their study titled 'Role of Yoga in Cardiac Disease and Rehabilitation' at Omaha, Nebraska in 2018. It showed favorable effects on systemic inflammation, stress, the cardiac autonomic nervous system, and traditional and emerging cardiovascular risk factors.

MATERIALS & METHOD

The study was interventional study where 20 subjects were selected using convenient sampling. The inclusion criteria to select the study population were hypertensive patients between the age group of 40-70 years. The exclusion criteria were any surgeries, neurological conditions, ophthalmologic condition and fractures. Materials used in the study included consent form, demographic data proforma, stethoscope, stopwatch, sphygmomanometer.

Procedure-A written consent was taken from all the subjects. Selection of the subjects was done as per the inclusion and exclusion criteria. The purpose and procedure of the study was explained to all the subjects prior to the study. Demographic data was noted down. An overview of practice was given to the patients. They were instructed to sit upright, resting their palms on their thighs. HR and BP was recorded before performing ANULOM VILOM. Instruct the subjects to perform ANULOM VILOM for 15 mins daily for 4

weeks. After completion of ANULOM VILOM pranayama immediately HR and BP measured again.

ANULOM VILOM:

1. Sit in comfortable balanced meditative pose
2. Use the right-hand thumb to close right nostril.
3. Inhale from the left nostril.
4. Close left nostril with right hand's index and middle fingers, Exhale from the right nostril.
5. Do the reverse.

STATISTICAL ANALYSIS

The obtained raw data was entered in Microsoft Excel 2010 Sheet and was statistically analysed.

The comparison was done within group for cardiovascular parameters during every week for a month.

The continuous variables were presented as p value and standard deviations. The continuous variables which were utilized for the study were as follows: age, systolic blood pressure, diastolic blood pressure and heart rate.

The categorial variable was gender and was presented in actual no. and percentage.

The intergroup comparison was baseline parameter of ANULOM VILOM (1st week) vs ANULOM VILOM (2nd week) vs ANULOM VILOM (3rd week) vs ANULOM VILOM (4th week).

The comparison was carried out so as to identify the difference between the groups and ANOVA test is used for determining significance.

The analysis was carried out with Statistical software STATA version 14.0

RESULT

The study which was undertaken for the effect of Anulom Vilom on Cardiovascular variables of hypertensive patient has yielded the following results.

The age of the subjects ranged from 40-70 yrs, the mean age being 53.1±8.35 years. There were 10 subjects in the age group of

40-50 years, 7 subjects in age group of 51-60 years and 3 subjects in age group of 61-70 years. Out of 20 subjects, 6 subjects were males and 14 were females.

In table no.1 multiple comparison of change in systolic blood pressure among different weeks was done and it showed significant p-value in week-1 vs week-3 and highly significant p-value in week-1 vs week-4.

Table No.1 Multiple comparison of change in systolic blood pressure among different weeks

Multiple comparison	Mean Difference	p-value
Week-1 vs Week-2	3.0	0.061, NS
Week-1 vs Week-3	4.0	0.0126, S
Week-1 vs Week-4	4.25	<0.0001, HS
Week-2 vs Week-3	0.68	0.9763, NS
Week-2 vs Week-4	1.25	1.000, NS
Week-3 vs Week-4	0.25	1.000NS

In table no.2 multiple comparison of change in diastolic blood pressure among different weeks was done and it showed significant p-value in week-2 vs week-4 and highly significant p-values in week-1 vs week-4.

Table No.2 Multiple comparison of change in diastolic blood pressure among different weeks.

Multiple comparison	Mean Difference	p-value
Week-1 vs Week-2	0.91	1.000, NS
Week-1 vs Week-3	0.91	0.6212, NS
Week-1 vs Week-4	3.41	0.0004, HS
Week-2 vs Week-3	0	1.000, NS
Week-2 vs Week-4	2.5	0.0486, S
Week-3 vs Week-4	2.5	0.001, NS

In table no.3 multiple comparison of change in heart rate among different weeks was done and it showed highly significant p-values in week-1 vs week-4.

Table No.3 Multiple comparison of change in Heart Rate among different weeks.

Multiple comparison	Mean Difference	p-value
Week-1 vs Week-2	4.41	0.0001, NS
Week-1 vs Week-3	4.36	<0.0001, NS
Week-1 vs Week-4	5.82	0.0001HS
Week-2 vs Week-3	-0.04	1.000, NS
Week-2 vs Week-4	1.41	1.000, NS
Week-3 vs Week-4	1.45	1.000, NS

After comparing the pre and post values of systolic blood pressure, diastolic blood pressure and heart rate it showed that the 4 weeks practice of ANULOM VILOM pranayama reduces the systolic blood pressure, diastolic blood pressure and heart rate in hypertensive patients.

Table 4: Comparison of change in systolic blood pressure at different weeks.

Weeks	Mean
Week 1	136
Week 2	133
Week 3	132
Week 4	131.75

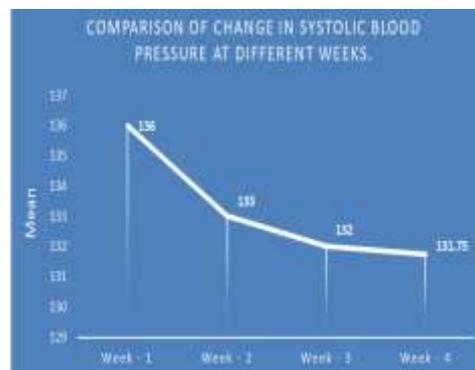


Figure 1: Comparison of change in systolic blood pressure at different weeks.

Table 5: Comparison of change in diastolic blood pressure at different weeks.

Weeks	Mean
Week 1	85.75
Week 2	85.25
Week 3	85.25
Week 4	82.75

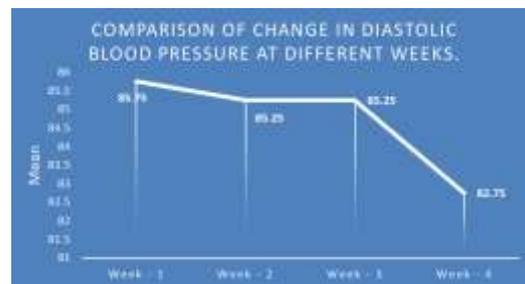


Figure 2: Comparison of change in diastolic blood pressure at different weeks.

Table 5: Comparison of change in heart rate at different weeks.

Weeks	Mean
Week 1	82.95
Week 2	78.6
Week 3	78.65
Week 4	77.3



Figure 3: Comparison of change in heart rate at different weeks.

DISCUSSION

In the present study, 20 subjects were taken in which 6 are male and 14 are females. The age of subjects varies from 40-70 years.

The subjects were informed to perform ANULOM VILOM for 4 weeks.

The result showed that it was supporting the aim which was to study the effect of ANULOM VILOM on Cardiovascular variables in hypertensive patients.

The comparison of Cardiovascular parameter in 1st week Vs 4th week were different and varying. The value obtained is shown in table no. 9,11,13 and also graphical representation in figure no. 3,4,5 of Cardiovascular parameters. The values of SBP, DBP and HR in 4th week are lower than 1st week.

Blood Pressure and Heart rate is related with Cardiovascular System, which is controlled by Autonomous Nervous System (ANS)⁽¹⁾. Pranayam accompanied by breath control increases cardiac output, decreases hepatic, renal blood flow and increases cerebral peripheral vessels blood flow⁽¹⁾.

In the study, a highly significant reduction in pulse rate, systolic blood pressure and diastolic blood pressure is seen.

Slow breathing induces a generalized decrease in the excitatory pathways regulating respiratory and cardiovascular systems⁽³⁾.

During slow and deep breathing lung inflates to the maximum. This stimulates pulmonary stretch receptors which bring about withdrawal of sympathetic tone in skeletal muscle blood vessels leading to widespread vasodilatation and decrease in peripheral resistance and thus decrease diastolic blood pressure⁽³⁾.

In the present study, the responses to 4 weeks of practice of ANULOM VILOM were assessed with respect to age and gender. The BP and HR of the subjects were taken once a week. It revealed that both males and females responded similarly to the yoga practice.

Although a significant decline in heart rate, systolic blood pressure, diastolic blood pressure after the yoga practice in the

present study is in accordance with the findings of other studies on physiological effects of yoga practice in healthy individuals, the present study has some differences. The present study involved regular practice of ANULOM VILOM for 4 weeks, whereas other studies reported impact of short term ANULOM VILOM on BP and HR in healthy volunteers.

These facilitate the fact that the effect of ANULOM VILOM Pranayama on Cardiovascular variables in hypertensive patients was achieved.

Earlier study of impact of short-term training of anulom vilom pranayam on blood pressure and pulse rate in healthy individuals has showed significant decrease in SBP.

The current study has shown decrease in decrease in cardiovascular parameters and same also found in earlier study.

CONCLUSION

In the present study, according to the results, this proved that the regular practice of ANULOM VILOM for 4 weeks decreases the heart rate, systolic blood pressure and diastolic blood pressure in hypertensive patients.

CLINICAL IMPLICATIONS- SUGGESTION

The study will help in reducing the systolic blood pressure, diastolic blood pressure and heart rate in hypertensive patients.

Declaration by Authors

Ethical Approval: Approved

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