



Impact of yoga practice on Cardiovascular Variables in Hypertensive Patients

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Abstract: Introduction: The practice of yoga dates back over 2000 years to ancient India, with a focus on the unification of the mind, body, and spirit through the practice of physical movements, meditation and breathing exercises. The practice of yoga is a custom in India and has been reported to be beneficial for the patients with hypertension (HTN). **Materials and Methods:** This is a prospective, descriptive and observational study. Department of Physiology, Index Medical College, Hospital and Research center Indore. Period of study is from January 2020 to December 2021. Seventy hypertensive subjects on yoga therapy and Seventy hypertensive subjects on without yoga therapy was enrolled in this study. Both groups were advised to continue their regular medicines. Their Blood Pressure recorded at their first visit and thereafter before and after the yoga session after 1 week. **Result:** A total of 70 patients who fulfilled the selection criteria during the study were enrolled. Yoga group Mean Systolic Blood Pressure of pre-test 136.79 ± 6.76 mmHg (Mean \pm SD) is reduced to Post-test 129.65 ± 6.65 mm of Hg (Mean \pm SD). In control group Mean Systolic Blood Pressure in pre-test 117.35 ± 5.67 mm of Hg and post-test 133.65 ± 6.12 . However, the difference in Systolic Blood Pressure in Yoga Group is statistically significant. (P value < 0.05). **Conclusion:** The results imply that simple yoga exercises may be useful as a supplementary BP therapy in addition to medical treatment when prescribed by primary care physicians. It is well known that physical activity has a BP lowering effect. A short Yoga program for patient to practice at home seems to have an antihypertensive effect, as well as a positive effect on self-rated quality of life and reduction of stress.

Keywords: Yoga, Hypertensive, Cardiovascular Variables.

INTRODUCTION

Yoga is one such alternative healthcare practice thought to improve blood pressure control. There is no single definition of the practice of yoga, that is universally accepted although it is generally described as an ancient tradition (originating 5,000 to 8,000 years ago) that incorporates postures, breath control, and meditation, as well as specific ethical practices. [1] Most relevant to the issue of blood pressure control is that yoga is increasingly being suggested by Indian health care providers as a means of enhancing health. Of the many benefits ascribed

to yoga practice, blood pressure control is among the most studied. [2]

The practice of yoga is a custom in India and has been reported to be beneficial for the patients with hypertension (HTN). Sustained and chronic exposure to stress can leads to a destructive process of neuroendocrine, metabolic and neuropsychological changes that results in the development and progression of cardio-vascular diseases (CVD) like HTN. [3] The stress dysregulation routes to HTN and affects the cardiovascular system, also reported to impair the cerebrovascular system and cognition decline. Emerging evidences suggests that sustained elevations in blood pressure may results cerebral vessel remodeling and promotes the pathological changes in brain associated with cognitive decline. [4]

Overall, HTN is notable and highly associated with cognitive decline, vascular dementia, and Alzheimer's disease. However, the risen issues with resistant HTN i.e. patients that does not responds to medication has led to the search and evolvement of other modalities, such as pranayama, for the effective regulation of blood pressure. [5] Pranayama may also have reported to improve one's memory, concentration, attention, sequential learning, eye-hand coordination and cognitive functions improvement. *Sheetali pranayama* is one of the well-known types cooling pranayama, contains inhalation through mouth and exhalation through nostrils. [6]

While several reviews regarding the potential benefits of yoga for reducing blood pressure and other cardiovascular disease risk factors have been published, most have stated that the quality of the studies are generally poor. [7] Additionally, few reviews have specifically focused on blood pressure control, and meta-analyses are lacking. Thus, the degree to which yoga may decrease blood pressure as well as the potential modifying effects of type of yoga intervention and type of comparison group remain unclear. To address these gaps, this research work presents a controlled study examining the effects of yoga practice on systolic and diastolic blood pressure in individuals with hypertension.

The purpose of this case controlled study was to determine the effects of yoga on BP and quality of life in patients in primary health care diagnosed with hypertension. Another aim was to investigate whether there is a difference in effect on BP and quality of life if yoga is practiced on a regular basis in a group led by a yoga instructor or if the patient practices a shorter yoga program individually at home.

MATERIALS AND METHODS:

This is a prospective, descriptive and observational study. Department of Physiology, Index Medical College, Hospital and Research center Indore. Either gender with age group of 30-60 years of hypertensive subjects according to JNC VIII (Systolic BP >140mmHG and Diastolic BP >90 mmHg) was included. Patients with history of liver disease, kidney disease and Diabetes were excluded.

Seventy hypertensive subjects on yoga therapy and Seventy hypertensive subjects on without yoga therapy was enrolled in this study. Both groups were advised to continue their regular medicines. Their Blood Pressure recorded at their first visit and thereafter before and after the yoga session after 1 week.

Subjects in yoga group underwent 1-week residential intervention consisting of repeated sessions of asana, pranayama, relaxation techniques designed for HTN (the module was being used for more than 20 years); individuals followed *satvika* diet consisted of low salt, low calorie, and high fiber food and devotional and counselling sessions. Individuals in the control group followed normal daily routines and were on antihypertensive medication.

Blood pressure was measured using a adult cuff manual sphygmomanometer with mercury device, and 3M Littmann classic stethoscope. The study participants were allowed to rest (relax) with the legs uncrossed and insure no smoking or caffeine 30 minutes before measurement. The participant was positioned in such a way that the left upper arm was at the same level as the heart. Then three blood pressure measurements were

taken 5 minutes apart in a sitting position. Finally, the mean of the second and the third BP readings were taken to determine the BP status of the participant.

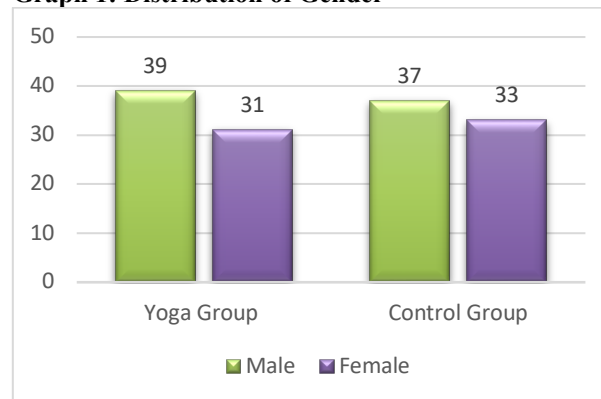
Statistical Analysis

The measurements data was statistically analyzed with the Statistical package for social sciences (SPSS) version 25th software was used. Pre-post test data of all the variables were presented as mean and standard deviation. Paired sample t test was used to assess within group changes for normal distributed data and independent sample t test was used for assessment of between group changes. At 95% interval, two-tailed P ≤ 0.05 was considered statistically significant.

RESULTS:

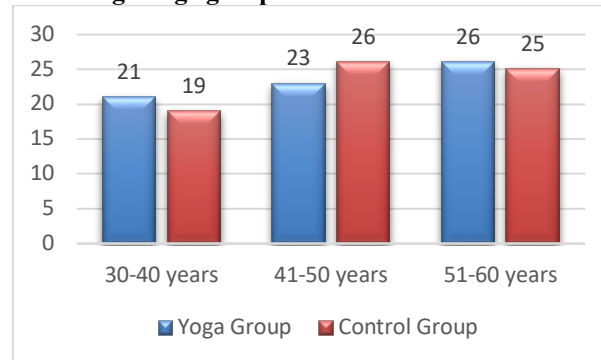
A total of 70 patients who fulfilled the selection criteria during the study were enrolled. The data were analysed, and the final observations were tabulated as below.

Graph 1: Distribution of Gender



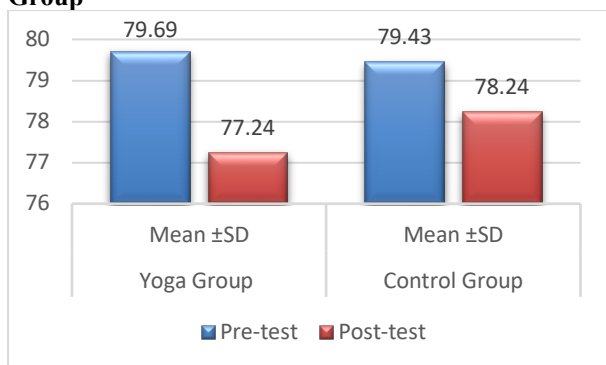
In Graph 1, of the 70 samples, 39 were males and 31 females, which correspond to 55.7% of male and the rest female in yoga Group and 37 were males and 33 females, which correspond to 52.8% of males in control group.

Graph 2: Distribution of the number of subjects according to age group



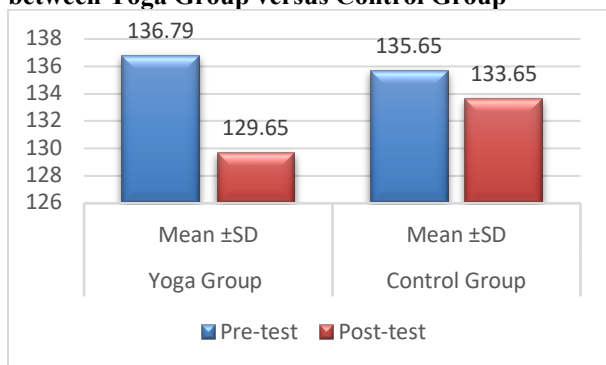
In this study, the maximum number of patients were in the age group of 51-60 years which were 37.1% (n=26) of total followed by age group 41-50 years having 32.8% (n = 23) followed by age group 30-40 years with 30.0% (n=21) in yoga Group in Graph 2.

Graph 3: Comparison of Mean Pulse Rate (beats/minute) between Yoga Group versus Control Group



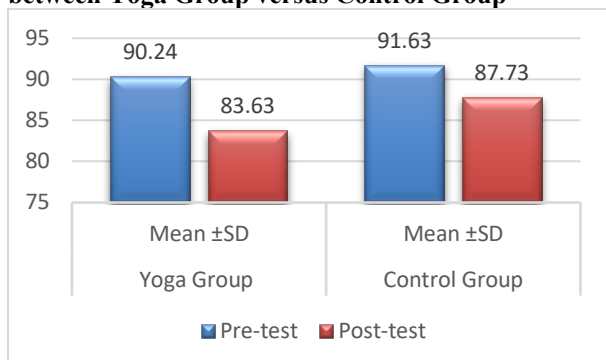
It is observed from **Graph 3** that, pre-test Yoga group Mean Pulse Rate is 79.69 ± 4.23 beats/min (Mean±SD) reduced to 77.24 ± 4.02 in post-test and control group pre-test Mean Pulse Rate of 79.43 ± 4.73 beats/min (Mean±SD) remain 78.24 ± 4.43 in post-test. The difference in Pulse Rate in yoga group is statistically significant in pre and post-tests. (P value < 0.05).

Graph 4: Comparison of Mean SBP (mmHg) between Yoga Group versus Control Group



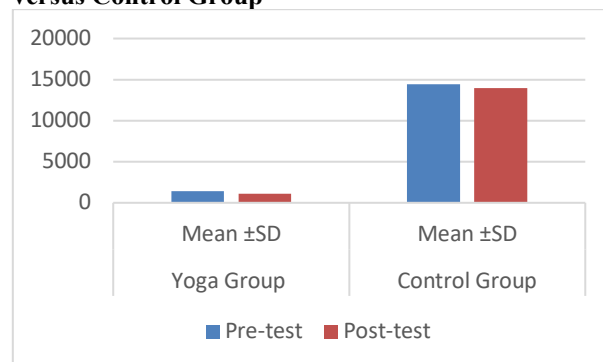
It is observed from **Graph 4** that, Yoga group Mean Systolic Blood Pressure of pre-test 136.79 ± 6.76 mmHg (Mean±SD) is reduced to Post-test 129.65 ± 6.65 mmHg (Mean±SD). In control group Mean Systolic Blood Pressure in pre-test 135.65 ± 6.35 mmHg and post-test 133.65 ± 6.12 . However, the difference in Systolic Blood Pressure in Yoga Group is statistically significant. (P value < 0.05).

Graph 5: Comparison of Mean DBP (mmHg) between Yoga Group versus Control Group



It is observed from **Graph 5** that, pre-test Yoga group Mean Diastolic Blood Pressure 90.24 ± 5.65 mmHg (Mean±SD) is reduced to Post-test 83.63 ± 5.12 mmHg. In control group Mean Diastolic Blood Pressure in pre-test 91.63 ± 5.83 mmHg and post-test 87.73 ± 5.33 . However, the difference in Diastolic Blood Pressure in Yoga Group is statistically significant. (P value < 0.05).

Graph 6: Comparison of Mean Peripheral vascular resistance (mmHg/min/mL) between Yoga Group versus Control Group



It is observed from **Graph 6** that, pre-test Yoga Group Mean Peripheral vascular resistance reduced from 1447.53 ± 154.43 mmHg/min/mL (Mean±SD) to Post-test 1094.64 ± 133.64 mmHg/min/mL. In control group Mean Peripheral vascular resistance in pre-test 14431.63 ± 154.83 mmHg/min/mL and post-test 14002.54 ± 143.82 mmHg/min/mL. However, the difference in Mean Peripheral vascular resistance in Yoga Group is statistically significant. (P value < 0.05).

DISCUSSION:

Hypertension is one of the most common diseases in the world, affecting approximately 26% of the adult population.^[8] Persistent hypertension increases the risk of developing coronary heart disease, stroke and other cardiovascular diseases, such as heart failure. Hypertension is a common diagnosis in primary health care and the societal costs of examination and treatment of hypertension and its consequences are considerable.^[9]

Although many antihypertensive drugs are available, less than one third of individuals in Europe who receive treatment reach their target blood pressure (BP) (140/90).^[10] Thus, additional strategies to normalize BP have been evaluated, e.g. lifestyle changes such as increased Yoga activity, physical activity, weight loss, dietary improvement, stress management and reduced tobacco and alcohol intake.^[11]

Previous studies have also shown that yoga may reduce BP.^[12] These studies showed significant reduction of systolic BP (SBP) of up to 6 mmHg and a significant reduction of diastolic BP (DBP) of up to 5 mmHg compared to baseline.^[13] Whether these

results are clinically significant remains an unanswered question.

Yoga has a BP lowering effect it may be useful as a supplementary therapy in addition to medical treatment. Since some studies have shown that yoga positively impacts quality of life and subjective well-being, patients who regularly practice yoga may also experience better quality of life. [14] The novelty of the present study is that it was performed in a primary care setting where most patients with hypertension are treated.

The present study was conducted to determine the effects of yoga on BP and quality of life in patients in primary health care. Our results demonstrated a significant reduction in SBP, DBP in the patients who practiced yoga compared to the control group ($p < 0.05$). The yoga at home group also showed a greater improvement in quality of life than the control group ($p < 0.05$). Patients who practiced yoga in a group with an instructor, however, did experience significant improvements in BP or self-rated quality of life compared to the control group.

In our study, significant improvement was found in Pulse rate which is quite surprising. Murgesan, 2000 has shown that decrease in the Pulse rate after yoga intervention. [15] There are some studies which showed significant increase in Pulse rate after yoga intervention (Raghuraj, 2008), these contradictory findings are due to variation in the intensity and duration of the yoga intervention in the studies. [16] Though our study shows significant decrease in the Pulse rate, we can see the trend towards decrease after intervention. Reason regarding decrease in pulse rate is reduced vagal tone. It also causes a reduction in heart rate as a result of change in the sympathetic stimulation and a change in the vascular system due to parasympathetic stimulation. [17]

Furthermore, it is quite surprising to see significant decrease in the systolic and diastolic blood pressure; similar findings were reported by Punita, 2015 in which there was a significant decrease in systolic and diastolic blood pressure along with significant decrease in Pulse rate in hypertensive persons. [18] The possible reasons for the reduction in blood pressures could be due to reduction in vagal tone as a result of relaxation caused due to controlled and slow breathing which is practised in pranayamas. [19] Another reason as mentioned by Thyagarajan et al. could be the “vascular conditioning” effect due to exercises. [20] Exercises produce a shearing force on the internal vasculature and increase the levels and availability of endothelial nitric oxide synthase enzyme which causes vasodilation and reduction in BP. [21]

The present study contributes to yoga-hypertension research by examining the effects of yoga

in a primary health care setting, where most patients with hypertension are treated. The shorter intervention can easily be taught to the patient by his or her own doctor at the health care centre. Previous studies have shown that yoga reduces BP. [22] However, the yoga intervention design varied among these studies and the length of the intervention ranged from 3 to 20 weeks, making it difficult to compare the interventions in terms of effectiveness. Furthermore, some of the studies combined the yoga treatment with other measures, such as changes in diet. [23]

On the other hand, one could argue that it is more difficult to improve quality of life when starting from a higher level. Additionally, the fact that the yoga at home group had an early private appointment with a study physician may in itself have had a positive effect on the results. [24] Patients probably adhere more to a doctor’s advice about yoga when yoga is used as a supplementary therapy. However, the patients in the yoga practice only met the doctor for 20 minutes, while the yoga class group patients met their instructor for 12 hours during the intervention period. [25]

CONCLUSION:

The results imply that simple yoga exercises may be useful as a supplementary BP therapy in addition to medical treatment when prescribed by primary care physicians. It is well known that physical activity has a BP lowering effect. For those patients who are not able or willing to do demanding exercise, an easy yoga program could be an alternative. It is interesting to note that a relatively small effort for the health care centre (in terms of number of visits) had the best effect on BP and quality of life. A short Yoga program for patient to practice at home seems to have an antihypertensive effect, as well as a positive effect on self-rated quality of life and reduction of stress. This implies that simple yoga exercises may be useful as a supplementary Blood pressure therapy in addition to medical treatment when prescribed by primary care physicians.

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