

# Effect of Chair Suryanamaskar on Blood Pressure in Individuals with Essential Hypertension: An Experimental Study

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## ABSTRACT

**Background:** Hypertension prevails widely due to an extensive chronic lifestyle and it is identified as an imperative public health problem worldwide. For prevention and management of the hypertension physical activity is essential. Chair yoga, chair aerobics and other forms of adaptive chair exercise are one of the implemented approaches for fitness in the middle-aged group.

**Objective:** The purpose of this study was to evaluate the effect of Chair-Suryanamaskar on systolic blood pressure, diastolic blood pressure and mean arterial blood pressure in essentially hypertensive individuals.

**Method:** In total 40 participants having essential hypertension were included in this study, they were divided into two groups. In the experimental group participants performed Chair- Suryanamaskar with ongoing medication for 4 weeks and in the control group participants were only on medication. systolic blood pressure, diastolic blood pressure and mean arterial blood pressure measured before and after 4 weeks of intervention and corresponding results were analyzed.

**Result:** Results of the between-group analysis showed a significant reduction in systolic, diastolic and mean arterial blood pressure for the experimental group compared to the control group. Additionally, within-experimental group analysis also yielded a significant reduction in blood pressure, while no significant reduction is observed for the within-control group.

**Conclusion:** Chair-Suryanamaskar can be integrated into the plan of care for essentially hypertensive individuals along with their on-going medication.

**Keywords:** Hypertension, Chair Suryanamaskar, Systolic blood pressure, Diastolic blood pressure, Mean arterial blood pressure

## INTRODUCTION

The World Health Organization (WHO) rates hypertension (HTN) as one of the most important causes of premature death worldwide.<sup>[1]</sup> It is estimated to cause 7.5 million deaths; about 12.8% of all deaths. The excessive high pressure on artery walls caused by HTN can damage blood vessels along with organ functions. This increases the risk of developing several dangerous health issues.<sup>[2]</sup>

If hypertension is unmanaged, it causes hardening and thickening of arteries (atherosclerosis), which decreases blood flow and oxygen to the heart. Hypertension can also have damaging effects on the brain, specifically, it can cause an aneurysm or stroke. Therefore, timely management of hypertension is vital. The management of hypertension mainly with pharmacological treatment includes different types of anti-hypertensive drugs. Pharmacological management is not always sufficient to

decrease the blood pressure levels. To effectively lower the blood pressure, American College of Sports and Medicine (ACSM) suggests exercising 5 to 7 days per week for more or equal to 30 minutes at a moderate intensity (40% - 59% Heart Rate Reserved).<sup>[3,4]</sup>

Prevalence of specific musculoskeletal pain symptoms such as neck pain, back pain, and knee pain increase above the age of 40. So for such population props can be included in the regular practice of yoga training to correct the difficulties involving strength, endurance, stability, mobility and postural challenges<sup>[5,6,7]</sup>. Suryanamaskar is a part of yogic practices and is believed to be an all-round exercise. regular practice of Suryanamaskar improves cardio-respiratory fitness.<sup>[8]</sup> However, for middle and old age population if it is impossible to perform traditional Suryanamaskar, for them we can use Chair-Suryanamaskar, which is a series of 12 poses in continuous flow which is synchronized with breathing. So the aim of this study is to evaluate the effect of Chair-Suryanamaskar on systolic, diastolic blood pressure, mean arterial blood pressure, in essentially Hypertensive individuals.

The study was a pre- post experimental design with random selection of 40 essential hypertensive individuals using a simple random sampling method.

Ethical approval for the study was granted by the Institutional Ethical Committee.

In this study male and females age group of 45 -65 years those who are having essential stage 1HTN as per Joint National Committee 8 guideline<sup>[9]</sup>as diagnosed by physician and under antihypertensive therapy were included

Individuals with secondary and stage 2 hypertension, obesity, addictions or other systemic illness, who has undergone major cardiothoracic surgery, major musculoskeletal and neurological conditions, history of active sports training, previous experience with yoga training were excluded from study.

Informed Written Consent was taken from the participants, pre-intervention blood pressure (SBP, DBP, MAP) were measured and 40 participants were divided into two groups by odd -even method in the experimental group participants performed chair Surya namaskar with ongoing anti hypertensive medication.

**METHOD**



**Procedure:**

For the Chair- Suryanamaskar participants had to sit on the stable chair both feet supported on the ground and back supported, it was a tailor-made 4-week / 5 days per week protocol

Warm -up Exercises	Whole body free movements (Neck movements, Shoulder circles, seated trunk rotation, Seated marching, Ankle movements). According to ACSM guidelines, warm-up was around 10 to 15 minutes <sup>[10]</sup>					
Chair Suryanamaskar Protocol	<table border="0"> <tr> <td>1 st week – 3 rounds – 6 times</td> <td rowspan="4">} twice a day</td> </tr> <tr> <td>2 nd week – 4 rounds – 8 times</td> </tr> <tr> <td>3 rd week- 5 rounds – 10 times</td> </tr> <tr> <td>4 th week – 6 rounds- 12 time</td> </tr> </table>	1 st week – 3 rounds – 6 times	} twice a day	2 nd week – 4 rounds – 8 times	3 rd week- 5 rounds – 10 times	4 th week – 6 rounds- 12 time
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4 th week – 6 rounds- 12 time						
Cool down period	consist of stretching of large muscle groups					

While in control group participants were only on anti-hypertensive medication. After 4 weeks SBP, DBP and MAP were measured and within group and between group pre and post data were statistically analysed.

## RESULT

Data were analysed in SPSS v 23. Data was not in normal distribution by Kolmogorov Smirnov test for normality, for SBP & DBP Wilcoxon signed ranked test was used for analysis within the group. Mann-Whitney U

test was used for analysis between the groups, for Mean Arterial pressure (MAP) Paired t Test use for analysis within group & Independent Sample t Test used for analysis between group.

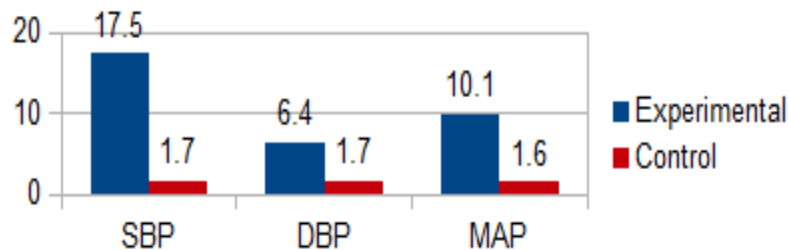
There is a fall of 17.5 mmHg in the mean SBP of an experimental group, which is far more than the reduction in the control group which is 1.7 mmHg. The fall in DBP is 6.4mm Hg in the experimental group and 1.7 mmHg in the control group. There is a reduction of 10.1mm Hg in MAP in the experimental group while 1.6mmHg in the control group.

TABLE 1: Comparison of Pre and Post Systolic Blood Pressure, Diastolic blood pressure& Mean Arterial pressure Of Experimental Group

Outcome	Difference in MEAN ( ± SD)	Wilcoxon signed ranked test / t value	p-value
SBP	17.5± 2.46	3.92	0.0001
DBP	6.4±0.96	3.86	0.0001
MAP	10.1±1.47	9.34	0.0001

TABLE 2: Comparison of pre and post systolic blood Pressure, diastolic blood pressure& mean arterial pressure Of Control group

Outcome	Difference in MEAN ( ± SD)	Wilcoxon signed ranked test / t value	p-value
SBP	1.7 ±2.48	1.40	0.005
DBP	1.7±0.19	2.32	0.020
MAP	1.6±0.49	2.96	0.0008



## DISCUSSION

The goal of the present study is to find out the additional effect of Chair-Suryanamaskar on blood pressure in essentially hypertensive individuals.

In this study there is a reduction in systolic blood pressure, diastolic blood pressure mean arterial blood pressure, in the experimental and control group, however, the following parameter is more significant in the experimental group as compared to the control group.

The reduction observed in the control group where due to the pharmacological effect of drugs, prescribed drugs to the participants mainly including  $\beta$  blockers combination of Amlodipine and Atenolol (Calcium channel blocker-  $\beta$  blocker) is the mechanism of action of  $\beta$  blockers which reduce the cardiac output by blocking cardiac  $\beta$  receptors. Reduction in Central sympathetic flow by blocking presynaptic  $\beta$  receptor centrally and reduction in renin in secretion at juxtaglomerular apparatus. Calcium channel blockers reduce heart rate and cause

coronary artery vasodilatation which also reduces peripheral vascular resistance. ACE inhibitor reduces the production of angiotensin II and increases the bradykinin levels and reduces the sympathetic nervous system activity.<sup>[11]</sup>

As for a technique of Chair -Suryanamaskar which essence of the slow and deep breathing along with the 12 poses.

Slow breathing induces a generalized decrease in the excitatory pathways regulating respiratory and cardiovascular systems. As respiratory and cardiovascular systems have similar control mechanisms, alteration in one system will modify the functioning of the other. During slow and deep breathing lung inflates to the maximum. This stimulates pulmonary stretch receptors which bring about the withdrawal of sympathetic tone in skeletal muscle blood vessels leading to widespread vasodilatation and a decrease in peripheral resistance and thus decreasing diastolic blood pressure. While practicing Chair-Suryanamaskar one concentrates on the act of breathing which removes attention from worries and Stress. This stress-free state of mind evokes relaxed responses in which parasympathetic nerve activity overrides sympathetic activity, which helps in the reduction of blood pressure.<sup>[12]</sup>

Impact of Yoga on Blood Pressure and Quality of Life in Patients with Hypertension.” Conducted by Priya JV et al., published in May 2017, the observation suggested that there is a mean reduction of DBP of 4.4 mmHg, so the results imply that simple yoga exercises may be useful as a supplementary BP therapy in addition to medical treatment. It is well known that physical activity has a BP lowering effect.<sup>[13]</sup>

## CONCLUSION

Thus, For those who are not able or willing to do demanding exercise, an easy Chair-Suryanamaskar program could be an alternative along with the drug regimen, in order to control the blood pressure in an essentially hypertensive individual.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Approval:** Approved

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