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Effects of 40 days of Pranayama Training in Hypertensive Subjects

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Abstract

Hypertension is the most important modifiable risk factor for coronary heart disease, stroke, congestive heart failure, end-stage renal disease and peripheral vascular disease. It accounts for a major part of morbidity and mortality due to cardiovascular diseases (CVD). Relaxation and stress relieving methods like Pranayama, Meditation has been shown to be capable of lowering blood pressure This study was undertaken to scientifically sdetermine the effects of Pranayamas namely anulomaviloma and Bhramari etc for mental relaxation and their effects on blood pressure with the help of following parameters viz. Heart rate, Bloodpressure (systolic + Diastolic blood pressure) in the hypertensive subjects and to compare the effects of Pranayama in two groups i.e. Group A, subject to Pranayama and with control Group B, who will not be subjected to any kind of Pranayama training. The mean BP profile parameters for patients after 40 days of Yoga were SBP 134.21±7.02 (mmHg), DBP 84.92±6.39 (mmHg), Pulse rate76.00±3.43 (beats/min) & Respiratory rate12.83±1.01 (resp./min).The corresponding values for controls were SBP 157.00±7.50 (mmHg), DBP 94.04±3.25 (mmHg), Pulse rate 76.71±7.62 (beats/min) & Respiratory

rate 14.42±2.24 (resp./min) respectively. The variation in respect of SBP not statistically significant. P>0.05. At the outset, before commencement of Yoga exercise the SBP

was160.46±7.02 (mmHg), DBP was 96.63±3.83 (mmHg), Pulse rate was 80.83±6.18 (beats/min), & Respiratory rate was15.33±1.49 (resp./min). After 20 days of commencement of Yoga exercise SBP became 153.58±6.65 (mmHg), DBP 91.50±5.41 (mmHg), Pulse rate

became 79.25±4.68 (beats/min)& Respiratory rate was15.04±1.04 (resp./min)and after 40 days of Yoga exercise SBP turned out to be 134.21±7.00 (mmHg), DBP84.92±6.39 (mmHg), Pulse rate 76.00±3.43 (beats/min),and Respiratory rate 12.83±1.01 (resp./min).While the

variations in all these parameters except for the Pulse rate (beats/min) was statistically highly significant as P<0.001, Pulse rate changes were also statistically significant P=0.004. Thus, we conclude that yogic practices combined with antihypertensive drugs were found effective in reducing BP & PR in resting condition and during stimulus induced conditions as well in mild to moderate hypertension. It reduced the requirement of the dose of antihypertensive drugs in majority of the hypertensive patients. Specifically it was found to affect cardiovascular autonomic regulation and tends to normalize it.

Keywords: *Hypertension Pranayama Blood pressure respiratory rate*

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Introduction

Hypertension is the most important modifiable risk factor for coronary heart disease, stroke, congestive heart failure, end-stage renal disease and peripheral vascular disease.[1] It accounts for a major part of morbidity and mortality due to cardiovascular diseases (CVD).[2]As per

World Health Organization (WHO), CVD will be the largest cause of death and disability in India by 2020[3] and nearly half of this mortality will be in young and middle-aged individuals. According to JNC-7(Joint National Committee 1997) the definition of hypertension is SBP as

140mmHg or higher or DBP as 90mmHg or higher or both and is estimated that it is effecting approximately 1 billion worldwide Whereas <120mm of Hg as SBP and <80mm of Hg as DBP is considered as normal blood pressure.[4]Currently, Indians experience CVD deaths at least a decade earlier than their counterparts in countries with well-established market economies.[5] Out of so many risk factors for essential hypertension, stress is one of modifiable risk factors as recently reviewed by WHO scientific group. Yoga is an ancient science in this Pranayama plays a very important role in hypertension. Relaxation and stress relieving methods like Pranayama, Meditation has been shown to be capable of lowering blood pressure. There has been evidence that slow and regular breathing i.e. Pranayama technique for a certain time everyday has been known to have a effect over cardio-vascular reflex control system. Numerous approaches are available for stress management that can decrease this patient's suffering and enhance their quality of life.[6] Pranayama breathing has shown to alter autonomic activity as it increases parasympathetic activity.[7] If hypertensive patients could adopt a simple relaxation technique that would reduce stress and its physiological effects, they may be able to control their BP better, decrease the requirements for antihypertensive drugs and respond better during such physiologically stressful events. Studies have shown a decrease in BP with pranayama.[7]This study was planned to examine the assess the effect of Pranayama for a period of 40 days for lowering blood pressure is to bring internal awareness of breathing and therapeutic benefits of Pranayama over stress level. This study was undertaken to determine the effects of Pranayamas namely anulomaviloma and Bhramari etc for mental relaxation and their effects on blood pressure with the help of following parameters viz. Heart rate, Bloodpressure (systolic + Diastolic blood pressure) in the hypertensive subjects and to compare the effects of Pranayama in two groups i.e. Group A, subject to Pranayama and with control Group B, who will not be subjected to any kind of Pranayama training.

Materials and Method

Materials:-

The study population was drawn from patients who presented to department of Physiology at Santosh Medical College. There were 50 patients, who were diagnosed and selected for study. All 50 patients were had hypertension and divided into 2 groups,

Group A: consisted 25 patients who were practiced 40 days pranayama for the period of 40 days,

Group B: consisted 25 patients with hypertension those were not doing any pranayama practice.

Methodology

A written consent was taken from all potentially eligible subjects and excluded from the study if they were not matched with inclusion criteria of the study. After taking detailed history, all subjects were having high blood pressure, non-alcoholic, non-smokers, not taking any drug other than antihypertensive medicine and were having similar dietary habits, physical and mental activities in working and home atmosphere. 40days Yoga Training was given to the subjectsin the morning hrs for 45min at 8:00 A.M to 8:45 A.M and two times in a week. Subjects were advised to come empty stomach for YOGA Training. The parameters were measured on 1st day and every month for 3 months of the study in both study and control group. The study group was asked to take yoga training along with anti-hypertensive drug treatment. The schedule ofyoga training was explained to all participants and after three days practice session, the actual practice of yoga was introduced.

The training includes Surya Namaskar for 5 minutes, rest for 5 minutes, Bhramari Pranayama for 5 minutes, Sukha Pranayama for 5 minutes, Nadisodhan (Anulom Vilom) for 5 minutes, rest for 5 minutes, Chandra nadi Pranayama for 5 minutes, Shavasana for 5 minutes and 'OM' meditation for 05 minutes. Blood pressure was measured in both arms using a mercury sphygmomanometer after a 15 minute rest. The average value was recorded as the patient's BP. Hypertension was being defined as the systolic blood pressure>140 mmHg and diastolic blood pressure>90 mmHg.

Statistical analysis:- Data was analyzed using Statistical Package for Social Sciences version 23 (SPSS Inc., Chicago, IL).). Results for continuous variables

are presented as mean ± standard deviation, whereas results for categorical variables are presented as number (percentage).

The level $P < 0.05$ was considered as the cutoff value or significance.

Observations and Results

There were 50 patients, who were diagnosed and selected for this study. All 50 patients were had hypertension and divided into 2 groups;

Group A: consisted 25 patients who were practiced 40 days pranayama for the period of 40 days;

Group B: consisted 25 patients with hypertension those were not had any pranayama practice.

The following observations were made:-

Table 1:- Demographic profile of patients before Yoga

	Group A [n=25] [Mean±S.D.]	**Group B [n=25] [Mean±S.D.]**	**P Value**
Weight	66.46±11.31	65.13±8.62	0.582
BMI	25.27±4.10	25.90±4.43	0.454

Table 2:- Distribution of Mean BP profile parameters before Yoga

Parameters	**A[Mean±S.D.]**	**B[Mean±S.D.]**	**P Value**
SBP [mmHg]	160.46±7.02	160.71±8.46	0.912
DBP [mmHg]	96.63±3.83	96.58±3.55	0.962
Pulse rate	80.83±6.18	78.88±8.57	0.371
Respiratory rate	15.33±1.49	15.25±1.33	0.845

Table 3:- Distribution of demographic profile of patients after 40 days of Yoga

Parameters	**Group A[n=25] [Mean±S.D.]**	**Group B[n=25] [Mean±S.D.]**	**P Value**
Weight	62.96±10.24	63.33±8.27	0.891
BMI	23.94±3.68	25.17±4.21	0.287

Table 4:- Distribution of Mean BP profile of patients after 40 days of Yoga

Parameters	**A[Mean±S.D.]**	**B[Mean±S.D.]**	**P value**
SBP [mmHg]	134.21±7.02	157.00±7.50	<0.001
DBP [mmHg]	84.92±6.39	94.04±3.25	0.213
Pulse rate	76.00±3.43	76.71±7.62	0.679
Resp. Rate	12.83±1.01	14.42±2.24	0.003

Table 5:- Changes in demographic profile before and after Yoga exercises [Case group]

Parameters	Before yoga	After 20 days of yoga	After 40 days of Yoga	P value
WEIGHT	66.46±11.31	65.46±10.70	62.96±10.24	0.513
BMI	25.27±4.10	24.87±3.77	23.94±3.68	0.475

Table 6:- Changes in BP profile of patients before and after Yoga [Case Group]

Parameters	Before yoga	After 20 days	After 40 days	P value
SBP[mmHg]	160.46±7.02	153.58±6.65	134.21±7.00	<0.001
DBP[mmHg]	96.63±3.83	91.50±5.41	84.92±6.39	<0.001
Pulse rate	80.83±6.18	79.25±4.68	76.00±3.43	0.004
Resp. rate	15.33±1.49	15.04±1.04	12.83±1.01	<0.001

Discussion

Yoga is an ancient science in this Pranayama plays a very important role in hypertension. Relaxation and stress relieving methods like Pranayama, Meditation has been shown to be capable of lowering blood pressure. There has been evidence that slow and regular breathing i.e. Pranayama technique for a certain time everyday has been known to have a effect over cardio-vascular reflex control system. Numerous approaches are available for stress management that can decrease this patient's suffering and enhance their quality of life.[6]

Patients of age between 30-45 years were selected for the study. There were 50 patients, who were diagnosed and selected for this study. All 50 patients were had hypertension and divided into 2 groups, Group A: consisted 25 patients (mean age 38.88±4.12) of 17 male & 8 female who were practiced 40 days pranayama for the period of 40 days, Group B: consisted 25patients (mean age 37.05±4.01) 15 male & 10 female with hypertension those were not had any pranayama practice.

Blood pressure is mainly dependent on cardiac output and total peripheral resistance. The possible mechanism is believed to be sympathetic nervous system over activity and consequent increase in peripheral vascular resistance. In addition, direct pressure effect by the sympathetic nervous system and catecholamine released from the adrenal medulla may also be involved. Hypothalamus is also closely related to limbic system which plays an important role in emotional and instinctual behavior. Since many manifestations of emotional changes like anger involve sympathetic responses, all these parts of the brain are likely to have some effect on the blood pressure. Stress too is likely to influence blood pressure through these pathways. Since, cerebral cortex is necessary for all voluntary actions, voluntary reduction of stress may be achieved by training the cerebral cortex. In the present study, the mean values of pulse rate, systolic blood pressure and diastolic blood pressure were recorded low in study group than in control group after the intervention. It is well known that yoga training decreases PR and BP. Environmental conditions and variety of behavioral factors such as stress, anxiety, affective and attitudinal dispositions of the individual influence the cardiovascular responses. Our findings of decrease in BP, and PR after yoga training are consistent with the findings of Rayet al.[8] that yoga training increases muscular endurance, delays onset of fatigue and enables one to perform work at lesser VO2 max. An exaggerated cardiovascular reactivity to the stressors is known to be a risk factor for cardiovascular diseases whereas reduced reactivity is an indicator of fitness. The result revealed that both Yoga intervention and drugs treatment helped. However, only mild and moderate cases of hypertension may be controlled easily without drugs. Severe case may need pharmacological intervention. The physical and physiological responses in the form of immediate effects of Kapalbhati Kriya or Ujjayi Pranayama of 15 minutes practice period show a gradual adaptive response over the 12 weeks training period. In the beginning the magnitude of these changes is much more but as one developed more and more mastery, these immediate changes reduce. But the neurophysiologic responses to these practices in the form of alterations in the EEG and in the subjective feeling of mental quietude and restful alertness instead of becoming less, actually become more and more intense. This indicates that the body learns to be more efficient and effective in dealing with any physical or physiological stress as one progress in Pranayama and thus makes the inner energy more easily and in more quantity accessible for the inner psychospiritual transformation. All these observations confirm the various claims about the various effects of Pranayama, as well as the significance of its various technical components including the part of inner awareness and also the need to practice it for the

fairly long time. It also shows that part form the many beneficial effects on the body, the practice of Pranayama trains the mind by reducing its restlessness and prepares it for the higher spiritual experiences of yoga.[9]

Conclusion

The mean BP profile parameters for patients after 40 days of Yoga were SBP 134.21±7.02 (mmHg), DBP 84.92±6.39 (mmHg), Pulse rate76.00±3.43 (beats/min) & Respiratory rate12.83±1.01 (resp./min).The corresponding values for controls were SBP 157.00±7.50 (mmHg), DBP 94.04±3.25 (mmHg), Pulse rate 76.71±7.62 (beats/min) & Respiratory rate 14.42±2.24 (resp./min) respectively. The variation in respect of SBP not statistically significant. P>0.05. At the outset, before commencement of Yoga exercise the SBP was160.46±7.02 (mmHg), DBP was 96.63±3.83 (mmHg), Pulse rate was 80.83±6.18 (beats/min), & Respiratory rate was15.33±1.49 (resp./min). After 20 days of commencement of Yoga exercise SBP became 153.58±6.65 (mmHg), DBP 91.50±5.41 (mmHg), Pulse rate became 79.25±4.68 (beats/min)& Respiratory rate was15.04±1.04 (resp./min)and after 40 days of Yoga exercise SBP turned out to be 134.21±7.00 (mmHg), DBP84.92±6.39 (mmHg), Pulse rate 76.00±3.43 (beats/min),and Respiratory rate 12.83±1.01 (resp./min).While the variations in all these parameters except for the Pulse rate (beats/min) was statistically highly significant as P<0.001, Pulse rate changes were also statistically significant P=0.004. Thus, we conclude that yogic practices combined with antihypertensive drugs were found effective in reducing BP & PR in resting condition and during stimulus induced conditions as well in mild to moderate hypertension. It reduced the requirement of the dose of antihypertensive drugs in majority of the hypertensive patients. Specifically it was found to affect cardiovascular autonomic regulation and tends to normalize it.

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