

Trio - Praanayama : Effect On Cardio-Vascular System In Some Volunteers

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ABSTRACT

Praanayama (deep breathing) can produce different physiological effects in normal man. The effect of the yoga have noted and analysed in 30 male individuals investigating cardiovascular parameters. Author was helped by senior physician and yogacharya. 30 subjects including author himself were classified into two groups of 15 each. Group A belonged to those who were started doing yoga just at same time research started. Three successive praanayama (TRIO) like slow Bhastrika, (a slow deep inhalation followed by slow deep exhalation.) Anulom-vilom, (alternative nostril inhalation-exhalation) and Bhramari (deep inhalation with soundy exhalation) were taken to study. The cardiovascular variables like the heart rate or pulse rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded. The PP (pulse pressure) mean arterial pressures (MAP) were calculated. All the above parameters were measured pre and post doings of Trio praanayamas for 30 days. Group B served the control group. Results what were observed were analyzed statistically. Trio (3 types) praanayama decreased HR, SBP, DBP, PP and MAP after 30 days of yoga significantly, with a p value of < 0.0001. No significant changes were observed in the Group B subjects (control). A slow but consistent praanayama practice for 30 days improved the para-sympathetic (vagal) functions which releases acetyl choline a neurotransmitter which suppressed the sympathetic (adrenaline) activity, thus indicating the para-sympathetic positivity on the cardiovascular system. These all breathing exercises can also relieve stress, and these can also be performed by hypertensive patients as a complimentary naturopathy with drug therapy ie., more meditation with little medication.

Keywords: MAP, BP, Yoga

Received 02/01/2016

Revised 22/02/2016

Accepted 09/04/2016

Citation of this article

Vishwakant. Trio - Praanayama : Effect On Cardio-Vascular System In Some Volunteers. Int. Arch. App. Sci. Technol; Vol 7 [2] June 2016 : 53-56. DOI.10.15515/iaast.0976-4828.7.2.5356

INTRODUCTION

Praanayamas have been a spectacular part of the ancient Indian vedic philosophical art of Patanjali yoga. Praanayama is a controlled, disciplined and constant breathing exercise which involves mental integrity. Man hither and thither faces stress during entire day and goes for physiological ailments like essential hypertension, angina, psychosomatic disorder, metabolic syndrome, panic attacks of anxiety, hyperacidity, asthma and insomnia and many more. The cardiac functions are under check and balance between vagal (parasympathetic) and the sympathetic tones (adrenaline). Anomalies of the sympatho-parasympatho state, added to the stress, lead to major cardiovascular dysfunctions like cardio vascular diseases (CVD) and hypertension [1]. Chronic psychological stress, sympathetic hyperactivation and higher cardiovascular outputs are associated with development of hypertension, dyslipidemia, Diabetes Mellitus and Cardio Vascular Diseases [2].

Yoga and meditation has been a part of an ancient Indian culture had and has the potential effects in relieving stress, enhance health and improve fitness [3] by improving cardiorespiratory function, lipid profile [4], sleep [5], increasing strength [6] and reducing blood pressure (BP) [7].

According to ancient Indian vedic science, it was written and demonstrated that breathing with consciousness improves the mental and physical health. There were and are different types of praanayamas (life - air) that are specially advised for the treatment of various disorders. There are evidences that approved that praanayama proper practice leads to a deep psychosomatic relaxation [8,9] and an increase in the cardiorespiratory efficiency [10], and the autonomic functions [11]. Raghuraj et al., have explored the acute effect of fast and slow praanayamas on the heart rate function [12]. Tells and

Desiraju have demonstrated the cardiac rhythm changes during the performance of different praanayamas [13]. Patel and North also reported a decrease in the Arterial blood pressure in hypertensive patients who were trained in the yoga relaxation methods [14]. Prarnik T et al., found a decrease in the heart rate and the blood pressure after the bhramari and the bhastrika praanayamas [15,16]. Gobel FL,et al., elucidated that rate pressure product (RPP) is a reliable index of the myocardial oxygen consumption and the cardiac output and it correlates with the myocardial oxygen consumption of normal people and the patients with angina pectoris [17]. Praanayamas may affect the RPP by changing the preload and the afterload. Researches over Pranayams and their tremendous health benefits are going on worldwide but in India more work is to be done as it is birth place of yoga. However, not much of literature available on the effect of praanayamas on the heart rate, blood pressure and the other variables in normal human volunteers. Which is why, the present work was planned, to study the effect of praanayama training on cardiovascular responses like the heart rate, blood pressure, pulse pressure, mean arterial pressure.

MATERIAL AND METHODS

The present study was conducted under supervision of a physician and a yoga guru in the colony park where around author lives. Before start the research, permission from institute ethics committee was availed. This investigation was carried out on 15 healthy male subjects who were 25-50 years of age. Subjects who had a history of active sports training or yoga practice and physiological disorders such as diabetes, hypertension, bronchial asthma and CVD were excluded from the study. The nature and purpose of the study was explained to all the subjects. The subjects were divided into 2 groups of 15 each. Group A consisted of men (n=15) who practiced Trio (3 types) praanayamas (8 minutes each, total 24 minutes) daily in the morning before sun rise for 30 days. Group B who served as the controls (n=15) did not practice praanayama and any other yoga.

RESULT AND DISCUSSION

After a month reading was taken in the morning after 1 hr. of breakfast, the subjects were brought about to hospital at Agra medicity, kargil pump, Agra and got familiarized with the help of physician.

The pulse was counted for full one minute. It was measured by palpating the right radial pulse. The blood pressure was recorded from the right brachial artery by using a sphygmomanometer using palpatory and auscultatory methods respectively. Appearance of sound (I tone) was measured as systolic blood pressure (SBP) and disappearance of sound (II tone) was taken as diastolic blood pressure (DBP) [18]. Three BP recordings were taken at 5-minute intervals and the middle one of these values was included for the calculation. The pulse pressure (PP = SP - DP), the mean arterial pressure (MAP=DP+PP/3) were calculated for each reading. All the above parameters were measured before and after 30 days of the 3 types of praanayama training in the Group I subjects. All the parameters were recorded initially and after one month in the Group B control subjects also. The data which was collected from the 30 subjects were subjected to statistical analysis by using the Student's paired 't'- test. A 'p' value of less than 0.05 was considered as significant.

In subjects, 3 types of praanayamic breathing practice, led a significant decrease ($P < 0.0001$) in the heart rate, systolic pressure, diastolic pressure, pulse pressure, mean arterial pressure, after a month of the training period in the Group A subjects. No significant changes was observed in any of the parameters in the Group B controls who did not practice any type of praanayama.

TABLE : 1: EFFECT OF TRIO- PRAANAYAMAS PRACTICE ON VARIABLES FOR 30 DAYS STUDY ON NORMAL MALE VOLUNTEERS ,GROUP A (N=15) AND GROUP B (N=15).

Data are expressed as mean \pm SD with a p value of < 0.0001 .

Parameter	Group A		Group B (control)	
	BEFORE STARTING OF TRIO-PRAANAYAMAS	AFTER HAVING DONE OF TRIO-PRAANAYAMAS (30 days)	BEFORE STARTING OF TRIO-PRAANAYAMAS	AFTER HAVING DONE OF TRIO-PRAANAYAMAS (30 days)
HR(beat per minute)	75.46 \pm 2.61	70.45 \pm 2.58	78.21 \pm 2.04	79.88 \pm 1.88
SBP (mm Hg)	128 \pm 5.12	122.43 \pm 5.35	128.22 \pm 7.84	126 \pm 8.04
DBP (mm Hg)	78.98 \pm 2.98	72.38 \pm 3.00	84.60 \pm 8.32	86.73 \pm 7.90
PP (mm Hg)	48.36 \pm 2.03	44.41 \pm 1.99	41.16 \pm 3.55	43.46 \pm 4.27
MAP (mm Hg)	91.66 \pm 7.46	84.44 \pm 4.5	87.38 \pm 6.77	86.73 \pm 7.36

DISCUSSION

Yoga is widely used in India in the management of Hypertension and CVD and Diabetes. [19] The purpose of this study was to find out whether the praanayamas performance modulated the cardiovascular parameters or not. The all praanayamas practice for 30 days, resulted in a significant decrease in the basal heart rate (HR) and the blood pressure in the Group A subjects. On the other hand, there was no change in the basal heart rate in the control subjects. The basal heart rate is the function of the para-sympathetic system. Madanmohan and Rai *et al.*, reported that the praanayama training resulted in a decrease in the oxygen consumption [8,9]. These studies showed that the praanayamas training left an overall decline in the oxygen consumption, the metabolic rate and the load on the heart. Hence, this study reveals that Trio- praanayama training of 30 days duration produced a decrease in the basal sympathetic tone and an increase in the basal parasympathetic activity which brought cardiac functions at optimum level.

Pramanik *et al.*, reported that slow breathing meditation influenced the heart rate and the blood pressure through the para-sympathetic dominance [15, 16]. Praanayama makes the person concentrate on the process of breathing, and it de-stresses and relaxes him. This may decrease the release of adrenaline (epinephrine) i.e., decrease the sympathetic activity and hence, it may decrease the heart rate and the blood pressure [17]. In the present study, author found that 3 types of praanayama showed a significant decrease in the heart rate and the blood pressure, which was supported by the findings of many workers as Bharashankar Jyotsana R. [20], Makwana K. *et al.* [21], Gopal K. S. [22] and Kalwale P. K., Shete A. N. *et al.* [23]. G.V.Lathadevi *et al.*, [1] concluded that Praanayama increases the frequency and the duration of the inhibitory neural impulses and messages by eliciting the stretch receptors of the lungs while tidal volume inhalation takes place as in the Hering-Breuer reflex. This brings about a withdrawal of the sympathetic tone in the skeletal muscle blood vessels, resulting more vasodilatation, thus diminishing the peripheral resistance which turns in decreasing the diastolic pressure. The same physiological phenomenon was put forward by author in present work.

During voluntary expiration which happens when a person undergoes exhalatory phase of praanayama, the intra-thoracic pressure goes up and blood from the lungs is squeezed into the heart, consequently an increase in the stroke volume; the baro-receptors in the carotid sinus get signals for more pressure and they discharge more. The enhanced baro-receptor discharge inhibits the tonic discharge (release content) of the vasoconstrictor nerves and it excites the vagus innervations of the heart, leading to vasodilatation, hence a fall in blood pressure and bradycardia take place [24]. The decrease in the diastolic pressure was so significant, consequently, the pulse pressure (PP) and the mean arterial blood pressure (MAP) also decreased significantly. Most of the volunteers went into mental peace and calmness and a sense of well-being, thus supporting the parasympathetic stimulation.[1]

CONCLUSION

Slow Bhastrika, Anulom-vilom and Bhramari praanayama (TRIO-PRAANAYAMA) thus showed a strong tendency of improving or balancing the autonomic nervous system through an enhanced activation of the para-sympathetic system vis a vis hamper the hyperactivation of sympathetic system (Autonomic equilibrium) and thus, subjects under study as well as other people who face daily life stresses can practice yoga for mental relaxation and for the reduction of stress in daily life. Therefore, this simple naturopathy without side effects with the slogan "KARO YOG BHAGAO ROG" can be recommended to hypertensive and tachycardial patients as alternative therapy with proper monitoring, along with medical therapy.

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