

Original article:

A study on effect of nadi-shodhana pranayama on cardiac parameters

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Abstract

Introduction: Yoga is a science which has been practiced in India from over thousands of years. Besides its spiritual achievements, the practice of yoga is accompanied by a number of beneficial physiological effects in the body. To study the effect of NadiShodhana pranayama(NSP) on parameters of cardiovascular performance (heart rate, systolic blood pressure, diastolic blood pressure and pulse pressure) after twelve weeks of twenty minutes daily practice.

Material and methods: This cross sectional study was conducted in department of physiology at AJIMS, Mangalore to evaluate the effect of twelve weeks NSP for twenty minutes daily on cardiac parameters on 100 students. Wherein 50 students practiced NSP for twelve weeks and another 50 students were control. Parameters like heart rate, systolic blood pressure, diastolic blood pressure, pulse pressure were measured on day one and after twelve weeks in both study group as well as control group. Results in study group were compared with controls.

Results:A significant decline in basal heart rate ($P<0.001$), systolic and diastolic blood pressure ($P<0.001$) were observed when compared with control group.

Conclusion: It is evident from the present study that NSP produces a significant effect over parasympathetic system and reduces hear rate and blood pressure.

Key words-Nadi-shodhana pranayama, heart rate, blood pressure

Introduction:

Yoga is a psycho-somatic-spiritual discipline for achieving harmony between mind, body and soul, the ultimate union of one's individual consciousness (jivatma) with the Universal consciousness (paramatma)⁽¹⁾. Breathing is the only autonomic function that can be consciously controlled and it is the key in bringing the sympathetic and the parasympathetic nervous system into harmony⁽²⁾. Today's ever-changing, technologically advanced & highly competitive environment causes persistent stress to humans. Stress, according to health experts will cause more health problems than ever before, as it is characterized by change in set point of

hypothalamo-pituitary axis activity leading to stimulation of autonomic nervous system resulting in immediate effects on heart rate, blood pressure, temperature, respiratory rate, plasma catecholamine and corticosteroids.

Pranayama is known since ancient times to relieve stress and stabilize autonomic function of the body. Hence it was decided to study the effect of Pranayama on medical and dental students by comparing certain cardiac parameters.

Aims & objectives:

This study was undertaken to study the effect of NadiShodhana pranayama on parameters of cardiovascular performance like heart rate,

systolic blood pressure, diastolic blood pressure and pulse pressure after twelve weeks of twenty minutes daily practice.

Materials & methods:

The present study was done on 100 healthy first year medical and dental students of age group between 17 and 21 years of A J Institute of Medical Science, Mangalore. Study was conducted in department of physiology, A J Institute of Medical Science, Mangalore from December 2011 to December 2012 after obtaining written informed consent from subjects and clearance from Institutional Ethics Committee. Subjects were explained that cardiac parameters will be measured on day 1 and after 12 weeks of practicing NadiShodhana Pranayama (NSP). Then subjects were divided by lottery technique into study group, who will practice NSP 20 cycles daily for 20 minutes for about 3 months and control group, who will not practice any kind yoga or meditation during study period. Practice sessions were held between 5.30pm and 6pm, in a well-lighted

and properly aerated, calm and quiet room. Heart rate (beats per

Minute) - was measured by counting radial pulse for a minute. Three readings were taken and their average was recorded. Blood pressure (mm of Hg) - Both systolic and diastolic blood pressures were measured by auscultatory method by using sphygmomanometer and stethoscope. Three readings were taken and their average was recorded. Pulse pressure (mm of Hg) - was calculated as the difference between systolic blood pressure and diastolic blood pressure^(3,9).

Observations & results:

All data thus obtained were expressed in mean ± SD. Comparison of parameters were done by using students unpaired 't' test. Before and after NSP parameters were compared in study group by applying student's paired 't' test. SPSS software version-19 was used for statistical analysis. Results obtained were put up in graphs and tables.

Table 1: Age (in years) comparison between study group and control group

Group	N	Mean	Std. Deviation	
Study group	50	18.16	0.618	t = 0.9299 P = 0.3547
Control group	50	18.26	0.443	

Unpaired t test, p > 0.05

Table 2: Cardio Vascular Parameters before and after doing NSP in study group compared with control group

Variable	Control group		Study group		95% CI		P value
	Mean difference	SD	Mean difference	SD			
Pulse rate	-1.88	3.23	6.14	1.40	-9.01	-7.03	<0.001*
Systolic BP	-2.48	2.48	4.40	2.39	-7.85	-5.91	<0.001*
DiastolicBP	-0.36	-0.36	1.04	1.35	-1.97	-0.83	-0.83

Variable	Control group		Study group		95% CI		P value
	Mean difference	SD	Mean difference	SD			
Pulse pressure	-2.20	2.72	3.36	2.08	-6.52	-4.60	<0.001

Unpaired t test * Highly Significant

Discussion:

Breathing is the only autonomic function that can be consciously controlled and it is the key in bringing the sympathetic and the parasympathetic nervous system into harmony. A significant decline in systolic blood pressure and heart rate in the present study is in accordance with the findings of effect of the nadi-shodana pranayama after 4 weeks of regular practice⁽⁸⁾. Regulation of blood pressure is normally an involuntary process controlled by sympathetic nervous system and hypothalamus. Stimulation of posterior and lateral parts of hypothalamus activates the sympathetic nervous system. Hypothalamus is also closely related to limbic system which plays an important role in emotional and instinctual behaviour. 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⁽⁴⁾.

It is explained that, Nadishodhana pranayama is likely to influence blood pressure and heart rate through these pathways.

1. A practitioner of Pranayama not only tries to breath but at the same time tries to keep his attention on the act of breathing, leading to concentration. This act of concentration removes his attention from worldly worries and “de-stress” him. This may decrease

release adrenaline i.e. decrease sympathetic activity and hence decrease in heart rate, blood pressure⁽⁵⁾.

2. Pulmoflation produces wide spread vasodilatation in skeletal muscle vasculature due to withdrawal of sympathetic tone. This would lead to less venous return and consequently SBP declines⁽⁶⁾.

Diastolic blood pressure mainly varies with the degree of peripheral resistance and heart rate. ‘Nadi-shodhana Pranayama’ might have no any immediate effect on peripheral vascular resistance or it has some roles, but is obscured by a slow heart rate⁽⁷⁾.

Conclusions:

It is evident from the present study that NSP develops an ability to control cardiovascular autonomic function. There is reduction in sympathetic reactivity with practice of pranayama. A few minutes of practice daily may help in setting the mind better on works and studies. The daily practice could also be parts of physical fitness and life style modification programs in maintaining better physical and mental health to have a better future. Yoga not only has physiological effects but also improves the wellbeing of the student. Hence this technique can be used as a regular practice for combating stress and strain of everyday life.

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