RESEARCH ARTICLE

Dynamics of Heart Rate Induced by Sahaja Yoga Meditation in Healthy Normal Subjects above 40 Years

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ABSTRACT

Background: Ageing is associated with changes in cardiac autonomic control as measured by Heart rate variability. Heart rate variability is an indicator of the dynamic interaction and balance between the sympathetic and parasympathetic system. The HRV can be measured non-invasively. Therefore it becomes an attractive measure to use in the study of the ANS to response to different stimuli. Sahaja yoga meditation creates a thoughtless awareness by virtue of which a balance between the sympathetic and parasympathetic nervous system is achieved.

Aims & Objective: To evaluate and compare the HRV parameters in healthy subjects above 40 years before and after practice of Sahaja yoga meditation and to correlate HRV parameters with age.

Materials and Methods: The study included 30 healthy normal subjects above 40 years of age, willing for Sahaja yoga meditation, selected from JNMC campus as well as Wardha district. The study group was between 40-70 years of age. The time and frequency domain parameters of HRV were evaluated in all 30 subjects using RMS polyrite machine. The subjects were trained to practice sahaja yoga meditation. After 3 months of meditation practice, they were again evaluated for HRV parameters. The results were analyzed using unpaired student test & Pearson's correlation coefficient.

Results: The mean heart rate of the subjects decreased significantly from 72.59 ± 10.5 to 68.30 ± 7.5 (p value <0.05) after 3 months of meditation Increase in the HF was highly significant from the mean 99.39 ± 178.2 to 116 30 ± 147.52 p value < 0.01 after meditation practice. The LF/HF ratio decreased significantly after meditation. The time domain parameters i.e. SDNN and pNN50% were found to be significantly high (p value < 0.01) after 3 months of meditation Age was negatively correlated with the pre LF and pre HF which was not significant.

Conclusion: The present study signifies the role of Sahaja yoga meditation in the modification of age associated decline in the HRV in healthy subjects above 40 years. Therefore this study recommends daily practice of Sahaja yoga meditation for prevention of risk of cardiac autonomic dysfunction with increasing age.

Key Words: Ageing; Heart Rate variability (HRV); Sahaja Yoga Meditation

INTRODUCTION

India is witnessing a demographic transition, leading to a rapid increase in the number of older people. A child born 60 years ago in India had an average life expectancy at birth of 32 years, whereas a child born in 2007 is expected to live 64 years and longevity is expected to enhance further. India had the second largest number of elderly in the world.[1,2] Ageing is a recent origin.[3-5] It is not a disease.

Ageing is associated with changes in cardiac autonomic control as measured by Heart Rate variability.[6] It is influenced by various physiological factors including age, postural changes, and time of day. Pathological conditions such as congestive heart failure, diabetic neuropathy, and coronary heart disease also are associated with alterations in heart rate variability.[7] Heart rate variability (HRV) decreases with age.[8] HRV is an indicator of dynamic interaction and balance between the sympathetic and the parasympathetic systems. HRV is measured noninvasively. Therefore, it becomes an attractive measure to use in the study of ANS response to different stimuli.[9] The autonomic nervous system activity is affected by meditation.[10] Sahaja yoga meditation acts by awakening Kundalini (power of Desire) placed in the sacrum bone by virtue of which a balance between the sympathetic and parasympathetic nervous system is achieved.

Most of the studies on effect of meditation have been coupled invariably with practice of set of asanas. Aged and especially physically weak people may not be able to perform these asanas. While the literature indicated ongoing research on Sahaja Yoga meditation in countries such as India, Australia, Russia, United Kingdom and America, research focusing on investigating SY as a tool for prevention of all these diseases in healthy population, is lacking. This study assesses the effectiveness of sahaja yoga on Autonomic control of the heart in the form of heart rate variability related to ageing in Healthy subjects.

MATERIALS AND METHODS

The present study was conducted in the Department of physiology in postgraduate Research laboratory, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha in association with Lokmahavidyalaya, Bachelor road Wardha, one of the centers for "Sahaja Yoga Meditation" under the guidance of an experienced instructor. Study was approved by the Institutional Ethical Committee This is a prospective longitudinal study in which 30 normal healthy subjects willing for Sahaja yoga meditation were selected from JNMC campus as well as from Wardha district. The study group was between 40-70 years of age. The subjects were excluded for history of hypertension, heart disease, diabetes mellitus any medication and other yogic or physical exercises. The baseline parameters were recorded for each subject in the morning hours. All the 30 subjects underwent Sahaja yoga meditation training at the above mentioned centers. Regular follow up was done weekly to assure the attendance of subjects. The subjects were motivated by showing videos that contain shri Mataji Nirmala devi's speech which conveyed various benefits of Sahaja yoga meditation.

Sahaja Yoga Meditation Training

The Sahaja yoga session was conducted by an experienced instructor who taught subjects how to achieve this state by the use of silent psychological affirmations. The weekly sessions involved meditation, instructional videos, personalized instruction, and discussion of problems in relation to improving the experience of meditation. Subjects were encouraged to achieve this state of mental silence for a period of 10–20 minutes twice each day.

Recording of Heart Rate Variability

The resting heart rate and the Time domain and Frequency Domain measures of HRV was evaluated in all 30 subjects using RMS polyrite. HRV was assessed using guidelines of Task Force of The European Society of Cardiology and The North American Society of Pacing and

Electrophysiology.[11] 15 min Holter ECG was recorded in resting supine position. Then the subjects were trained to practice Sahaja yoga meditation. After 3 months of practice, HRV was again evaluated. Sahaja yoga meditation was performed daily for 20 min two times a day by the subjects at the sahaja yoga center and at home.

Statistical Analysis

The data was analyzed on windows for SPSS version 17 with unpaired student t test and Pearson's Correlation coefficient. p value of less than 0.05 was considered as significant difference and "r" was considered as coefficient of correlation.

RESULTS

The mean heart rate of the subjects decreased significantly from 72.59 ± 10.5 to 68.30 ± 7.5 (p value < 0.05) after 3 months of meditation. (Table 1 & figure 1). The frequency domain parameter, LF decreased from the mean 217.09 ± 17.4 to 211.65 ± 14.7 but it was not significant (Table 1 & figure 2). Increase in the HF was highly significant from the mean 99.39 ± 178.2 to 116 30 ± 147.52 p value < 0.01 after meditation practice. (Table 1 & figure 3).The LF/HF ratio decreased significantly after meditation (figure 4). The time domain parameters i.e. SDNN and pNN50% were found to be significantly high (p value < 0.01) after 3 months of meditation. Changes in RMSSD were not significant (Table 2). Age was negatively correlated with the pre LF and pre HF which was not significant (Table 3, 4).

Table-1: Components of Heart Rate Variability before and after Sahaja Yoga Training

Parameters		Mean	SD	p value	
Age		53.93	7.28		
MIN HR	Pre	72.5937	10.5847	< 0.05	Significant
	Post	68.3097	7.55878		
Variance	Pre	1625.31	1268.5	< 0.05	Significant
	Post	1943.03	1618.37		
LF	Pre	217.09	175.42	> 0.05	Not Significant
	Post	211.65	147.90		
HF	Pre	99.39	116.3	< 0.01	Highly Significant
	Post	178.27	147.525		
LF/HF	Pre	2.94	1.78	< 0.01	Highly Significant
	Post	1.30	0.56		

Table-2: Time Domain Parameters of Heart Rate Variability before and after Sahaja Yoga Training

Parameters		Mean	SD	p value	
SDNN	Pre	43.66	22.26	<0.01	Highly Significant
	Post	45.24	22.86		
RMSSD	Pre	39.15	20.51	>0.05	Not Significant
	Post	39.82	19.92		
pNN50%	Pre	6.53	0.81	<0.05	Significant
	Post	7.58	0.54		

Table-3: Correlation of Age with LF Pre Values

Parameter	Mean	SD	N	Correlation 'r'	p-value
Age	53.93	7.28	30	-0.10	0.63, p<0.05, Not Significant
LF Pre-Sahaj Yoga Values	217.09	175.42	30		

Table-4: Correlation of Age with HF Pre Values

Parameter	Mean	SD	N	Correlation 'r'	p-value
Age	53.93	7.28	30	-0.08	p<0.05, Not Significant
HF Pre-Sahaj Yoga Values	99.4	116.30	30		

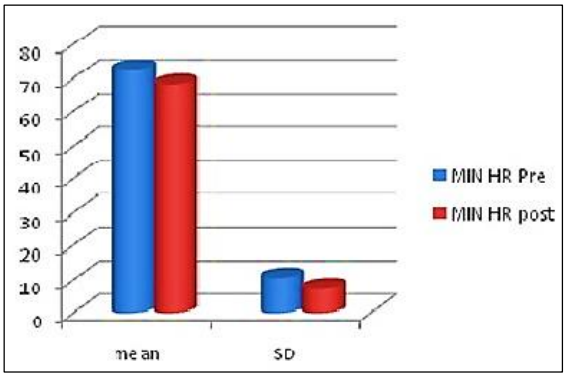

Figure-1: Pre and Post Min Heart Rate

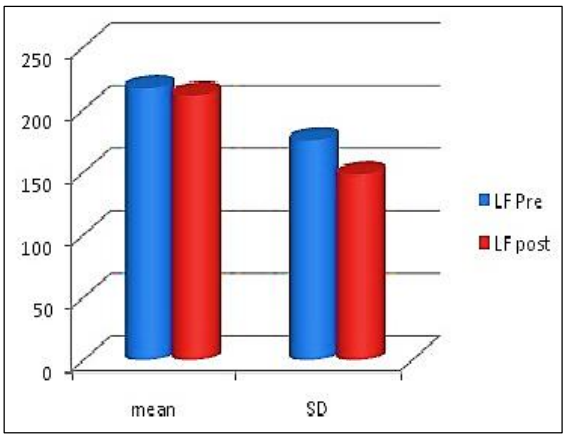

Figure-2: Pre and Post LF Component

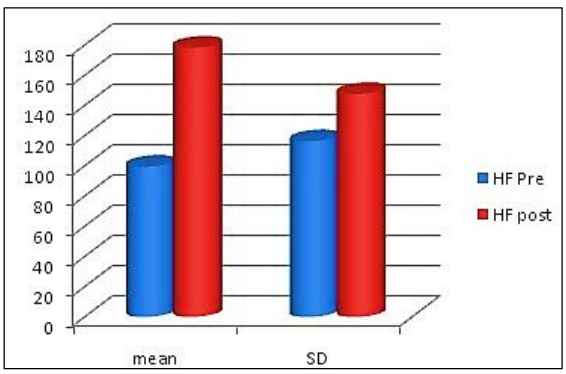

Figure-3: Pre and Post HF Component

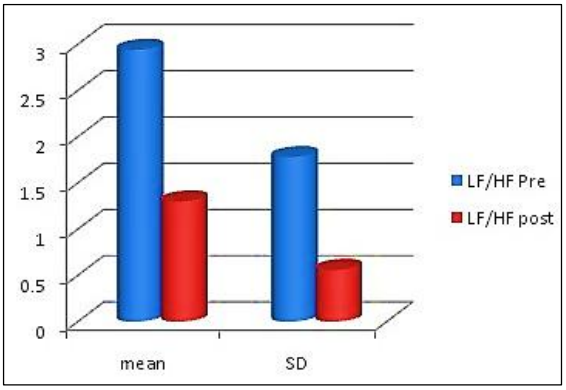

Figure-4: Pre and Post LF/HF Ratio

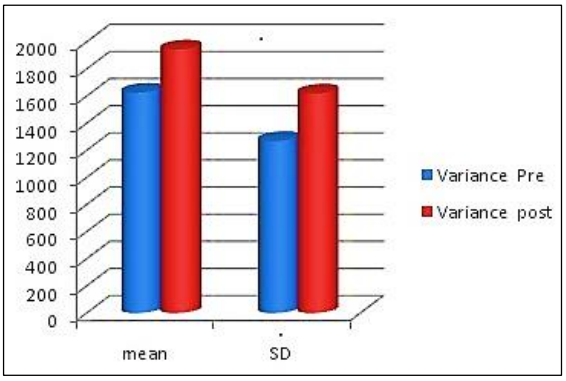

Figure-5: Pre and Post Variance

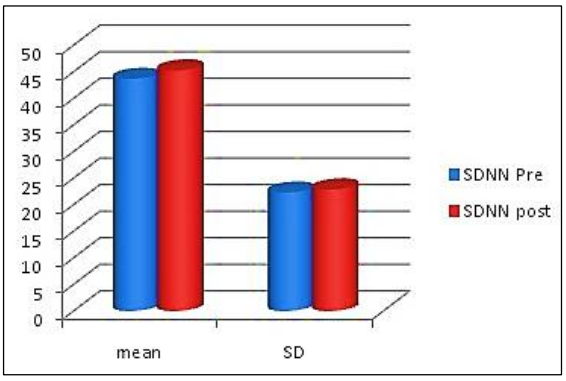

Figure-6: Pre and Post SDNN

DISCUSSION

This study shows reduction in the mean heart rate after practice of sahaja yoga meditation which is consistent with the finding of C K penga et al who studied heart rate dynamics during three forms of meditation in which there was significant reduction in resting heart rate during relaxation response and breath of fire.[12] The study of Desh Deepak et al of PNS functional status in meditators showed that Heart rate (HR) increased gradually in non-meditators with age, while in meditators it was lower in subjects 41-55 years and 56 years above.[13] Qairunnisa. S et al evaluated the effect of sequential performance of one Yogic breathing patterns which showed significant increase in resting heart rate in 20 subjects as compared to control from mean.[14] S. B. Jore et al in their study showed decrease in the heart rate with regular practice of pranayama which was attributed to increase in vagal tone.[15] Our study does not support the finding of Bhavani Balakrishnan et al in which the effect of isha yoga on cardiac autonomic nervous system using short-term heart rate variability showed no significant reduction in resting heart rate.[16] Vempati and Telles assessed the effect of yoga based guided relaxation on autonomic variables and found that power of high frequency component increased suggesting reduced sympathetic activity and increased parasympathetic activity[17] which is consistent with the findings of our study.

Marian E P et al showed increase in SDNN after 8 weeks of hatha yoga practice which was not significant.[18] But our study shows significant increase in SDNN. The SDNN findings of the present study favors the findings of Kerstin Khattab et al who studied the HRV in 11 healthy subjects who undervent both yoga and placebo intervention which was compared with the control group and found that the Standard deviation of NN interval (SDNN) was not significantly different during yoga exercise compared to the placebo program, but was significant for both compared to the control at time of intervention.[19] In study of inward attention meditation of Shr Da et al the results showed that there was decrease in LF/HF ratio and LF norm as well as increase in HF morm during inward attention meditation which suggested a sympathovagal balance towards parasympathetic activity which is in accordance with our study.[20]

There was a significant increase in the pNN50% after 8 weeks of hatha yoga practice in the study of Marian E P et al which goes in favor of the present study but the recordings were of 24 hrs.[18] yoga respiratory training produced a significant decrease in the LF component of heart rate variability and thus a shift in the sympathovagal balance towards a reduction in sympathetic predominance in the study of Danilo

S F et al which is in accordance with the present study.[21] In the pilot study of Kerstin khattab et al the influence of some yoga techniques (pranayama and shavasana) on autonomic modulation of cardiac function short term spectral analysis of heart rate variability showed lower LF and higher HF values in the yoga group as expected. The LF/HF ratio was lower in the yoga group indicate enhanced parasympathetic modulation of heart rate variability and better sympathovagal balance in yoga practitioners.[19] These differences were not statistically significant because of smaller sample size according to them.

Recent studies with SY meditation in the treatment of anxiety, depression[22], work stress[23], hot flushes and other menopausal symptoms, hypertension and heart diseases[24], asthma[25] and seizure control and EEG changes in patients of epilepsy[26] have shown significant results.

It is well established that the hypothalamus is a major substation of the limbic system and one of its most important roles is to integrate complex responses via the autonomic and somatic nervous systems Numerous effects like decreases in blood pressure, skin temperature, and increases in skin resistance could be due to inhibition of the posterior hypothalamic area; or these changes could be due to the effects of the hypothalamus as it acts on the medullary centers through the reticular activating system. The influence of the hypothalamus on the adrenal medulla via the sympathetic nervous system can decrease the output of adrenaline. The hypothalamus is connected to the reticular activating system in part by the mammillary tract and has the ability to influence the incoming flow of sensory stimuli through its action on synapses of all afferent sensory systems. The inhibition of the reticular activating system can lead to stoppage of the flow of irrelevant sensory information allowing certain thalamic nuclei to facilitate specific alpha wave frequencies in the cerebral cortex that indicate a relaxed state of mind. Sahaja yoga probably acts via all these mechanisms.

CONCLUSION

Age related impairment in the parasympathetic control of the heart is a causal component for increased risk of cardiovascular diseases like arrhythmia and sudden cardiac death in the elderly. Sahaja yoga meditation can modify the age associated decline in HRV in normal healthy subjects above 40 years and shifts the sympathovagal balance towards parasympathetic component. Therefore, this study recommends daily practice of Sahaja yoga meditation for prevention of risk of cardiac autonomic dysfunction with increasing age.

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