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ORIGINAL ARTICLE

Effect of Sahaja Yoga Meditation on Heart Rate Variability

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ABSTRACT

Introduction: Nowadays, people are showing a keen interest in yoga and meditation as an alternative therapy to manage psychological stress and stress-related diseases. Yoga is a spiritual discipline with many proven health benefits. There are different types of yoga techniques practiced worldwide for their known health enhancement effects and for reduction of stress and its related disorders. One of the meditation techniques is Sahaja Yoga. It is a unique technique of meditation that involves mental state of internalized attention characterized by mental silence and emotionally positive experience of bliss. The present study has been undertaken to find out the heart rate variability (HRV) in Sahaja Yoga meditators during rest and meditation.

Objectives: To study the HRV in Sahaja Yoga meditators during rest and meditation.

Materials and methods: A total of 20 volunteers aged 25 to 40 years were considered for the study. The volunteers were practicing Sahaja Yoga meditation (SYM) regularly for 5 years or more. The HRV was recorded during rest with eyes closed and 15 minutes of SYM in a quiet room.

Results: Statistical analysis was done using student paired t test. Results are given as mean ± standard deviation (SD). The mean R–R interval, total power (TP), low frequency (LF), high frequency (HF), and LF/HF ratio were studied during rest and during meditation. The HF (during rest 16.2383 ± 11.1896 and during meditation 28.4875 ± 14.5112) was high and LF/HF ratio (during rest 2.262211 ± 1.346382 and during meditation 1.30545 ± 1.200041) was low during meditation compared with that during rest, which was statistically significant.

Conclusion: Increase in HF and decrease in LF/HF ratio during meditation signifies that meditation shifts sympathovagal balance toward the parasympathetic side, hence signifying a relaxed state of body and mind in Sahaja Yoga meditators.

Keywords: Heart rate variability, Meditation, Sahaja Yoga meditators, Stress, Sympathovagal balance.

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INTRODUCTION

The World Health Organization (WHO) has defined health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[1] According to the WHO Global status report 2010, noncommunicable diseases (NCDs) are the leading cause of death globally, killing more people each year than all other causes combined.[2] In India, NCDs account for 60% of all deaths, making them the leading cause of death.[3] It is now believed that one of the root causes of most of these NCDs is stress. Stress is defined as "any stimulus that disturbs or interferes with the normal physiologic equilibrium of an organism." Every human being experiences some sort of stress in their day-to-day life. The negative effects of stress on human body described in the literature are numerous and involve almost all organ systems. Recent studies have now shown that stress impairs immune functioning of an individual and hence fails to protect the optimal functioning of many vital organ systems.[4]

Yoga and Meditation

Yoga is considered by many as one of the best tools to manage stress. Yoga is said to originate from India in 5000 BC. Around 900 BC, the ancient sage Patanjali evolved the eight stages of yoga, which is called as Ashtanga Yoga. Yoga combines specific postures (asanas), breathing techniques (pranayama), meditative techniques (dhyana), chants (mantras), and wisdom teachings (sutras) to encourage union of body and mind. Yoga is a psychosomatic-spiritual discipline for achieving union and harmony between mind, body, and soul and the ultimate union of our individual consciousness with the universal consciousness or divine.

In India, many types of yoga techniques are practiced, such as Hatha Yoga, Sahaja Yoga, Raja Yoga, Jnana Yoga, Integral Yoga, Karma Yoga, Bhakti Yoga, Mantra Yoga, Kundalini Yoga, Laya Yoga, and many more.[5] In recent years, yoga has gained worldwide attention for

the treatment of various diseases and maintaining good health. It is estimated that more than 30 million people in the world today are practicing yoga for its health benefits.[6,7] Meditation is an integral part of yoga. Meditation practice helps in reducing stress to a great extent.[8] When practiced regularly, meditation is believed to assist in the build-up of consistent insensible behaviors of microdimensions with constructive effects on physiological and psychological performance of human beings. Meditation reduces the activity of the sympathetic component of the autonomic nervous system while at the same time enhancing the activity of the parasympathetic component. This process results in relaxation response of the body, manifesting as slowing down the heart rate and increase in the blood flow to the viscera.[9]

According to some recent studies, the vagal nerve complex plays a crucial role in modulating the body's inflammatory response to infectious disease, other forms of physical injuries, and psychosocial stress.[10-13] The body's inflammatory response plays a major role in the pathogenesis of many acute and chronic diseases. Studies have shown that meditation and yoga practices modulate the activity of vagal nerves.[14]

Heart Rate Variability

The heart rate is controlled by the autonomic nervous system. This system has two parts, the sympathetic and the parasympathetic. The sympathetic branch increases heart rate and the parasympathetic branch decreases heart rate. Heart rate variability (HRV) is an indicator of the dynamic interaction and balance between these two branches of the system. Heart rate variability is the amount of heart rate fluctuation around the mean heart rate, which can be used as a mirror of the cardiovascular health. It is valuable noninvasive tool to investigate the sympathetic and parasympathetic function of autonomic nervous system and is used to study various human physiological responses to different stimuli like exercise, stress, and meditation.[15-17]

Sahaja Yoga Meditation

Sahaja Yoga meditation (SYM) employs simple applications of silent affirmations. It assists an individual to achieve a state of mental silence in which the entire attention is focused on the present moment and one is free from unnecessary mental activity. Target experience of SYM is a state of thoughtless awareness characterized by the mental silence and emotionally positive experience of bliss.[18] This internal silence turns out to be a source of personal peace that counteracts the complexities of day-to-day existence including psychological stress while improving creativity, efficiency, and self-confidence.[19] Numerous studies have shown that the autonomic nervous system activity is affected by meditation.

This study was undertaken to observe the effect of SYM on HRV.

MATERIALS AND METHODS

The study was conducted in the clinical laboratory of the Department of Physiology, Mahatma Gandhi Mission Medical College, Navi Mumbai, India, in association with International Sahajayoga Research and Health Centre, Navi Mumbai, India. A total of 20 volunteers aged 25 to 40 years participated.

Inclusion Criteria

- Men and nonpregnant women in the age group of 25 to 40 years.
- Subjects regularly practicing SYM and attending nearest Sahaja Yoga center located in Mumbai and Navi Mumbai for the last 5 years or more.
- Those subjects who were willing to give consent and comply with the study protocol.
- All subjects were screened by a senior physician by taking detailed history and examination for general physical health. Healthy persons and those who were not on medications were considered for the study.

Informed consent was taken from all subjects. The ethical committee approved the study.

Exclusion Criteria

- Those subjects who smoked cigarettes and consumed tobacco and alcohol or had any major physical illnesses.
- Those subjects taking medications that are known to alter the HRV.
- Subjects who were on any prophylactic medications, multivitamins, health supplements, Ayurvedic or homeopathic medicines for health promotion.

Recording of HRV

The HRV was recorded during rest with eye closed and 15 minutes of SYM in a quiet room. The probe of pulse oxymeter was clipped to the subjects' left index finger; care was taken that the subject did not move their hand. The probe was connected to the annuphotorheograph that was in turn connected to a personal computer applying software (Variability Analyzer 2008). The recorded HRV raw data were analyzed to get HRV graph and Fast Fourier transform power spectrum. For computing HRV indices, a recommendation of task force was followed.[16] Very low frequency (VLF), low frequency (LF), and high frequency (HF) spectral powers were determined by integrating power spectrum between 0.00 and 0.04, 0.04 and 0.15, and 0.04 and 0.5 Hz respectively, and expressed

in normalized units. Total power (TP) was calculated between 0.00 and 0.5 Hz and illustrated in absolute unit of millisecond squared.

STATISTICAL ANALYSIS

The data were analyzed by applying paired t test. Results are given as mean ± standard deviation (SD); p-value <0.05 was considered as significant.

RESULTS

The mean R–R interval, TP, LF nu, HF nu, and LF/HF ratio were studied during rest and during meditation. The mean R–R interval of the subjects increased from 0.7070 ± 0.707 during rest to 0.7080 ± 7.675 during meditation (Table 1 and Fig. 1). The frequency domain parameters, the TP, increased from a mean of 898.15 ± 731.1756 ms^2 during rest to 967.745 ± 1597.5783 ms^2 during meditation (Table 1 and Fig. 2). Very low frequency decreased from the mean of 22.8591 ± 9.4900 during rest to 15.2207 ± 6.7726 during meditation significantly (Table 1 and Fig. 3). Low frequency also decreased from the mean of 27.0565 ± 11.2199 during rest to 26.4967 ± 13.8779 during meditation, but not significantly (Table 1 and Fig. 4). Increase in the HF was highly significant from the mean of

Table 1: Heart rate variability parameters in rest and meditation

HRV parameter	*Rest (mean ± SD)*	*Meditation (mean ± SD)*	*t-value*	*p-value**
Mean R–R interval	0.7070 ± 0.707E-02	0.7080 ± 7.675E-02	–0.114	0.910
TP $(ms)^2$	898.15 ± 731.1756	967.745 ± 1597.5783	–0.270	0.790
VLF (nu)	22.8591 ± 9.4900	15.2207 ± 6.7726	3.354*	0.003
LF (nu)	27.0565 ± 11.2199	26.4967 ± 13.8779	0.171	0.866
HF (nu)	16.2383 ± 11.1896	28.4875 ± 14.5112	–4.454*	0.000
LF/HF ratio	2.308001 ± 1.346381	1.310721 ± 1.20004	4.485*	0.000

*p-value <0.05 is significant

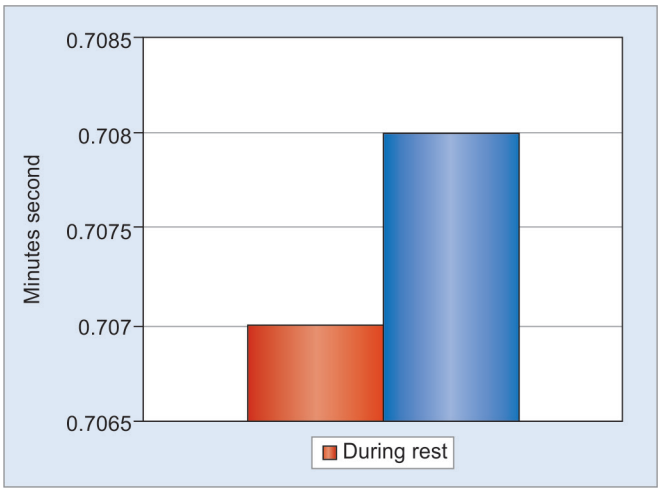

Fig. 1: Mean R–R interval during rest and meditation

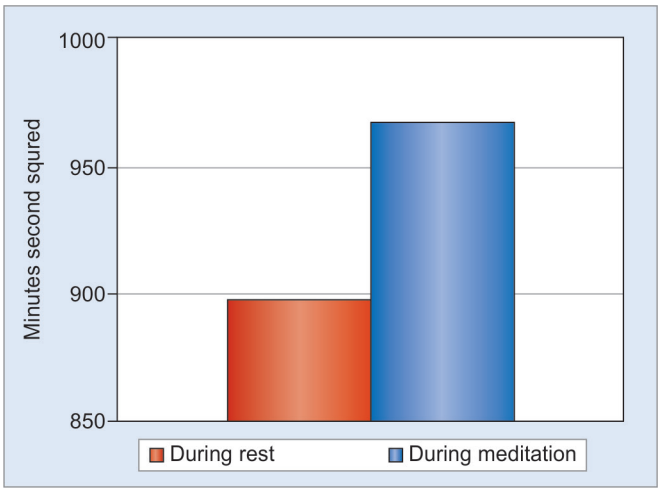

Fig. 2: Total power during rest and meditation

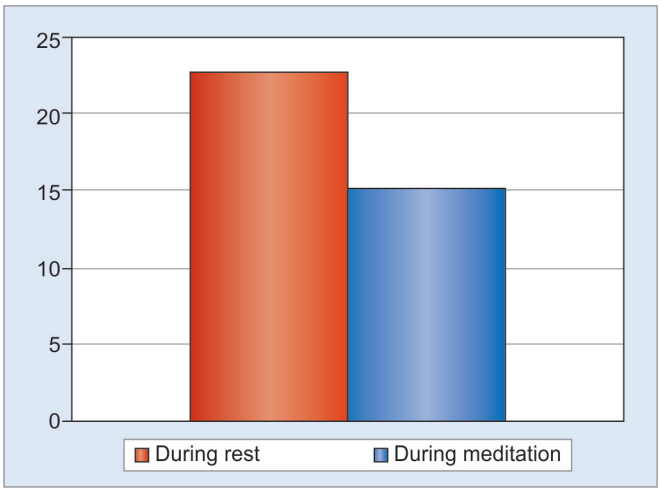

Fig. 3: Very low frequency during rest and meditation

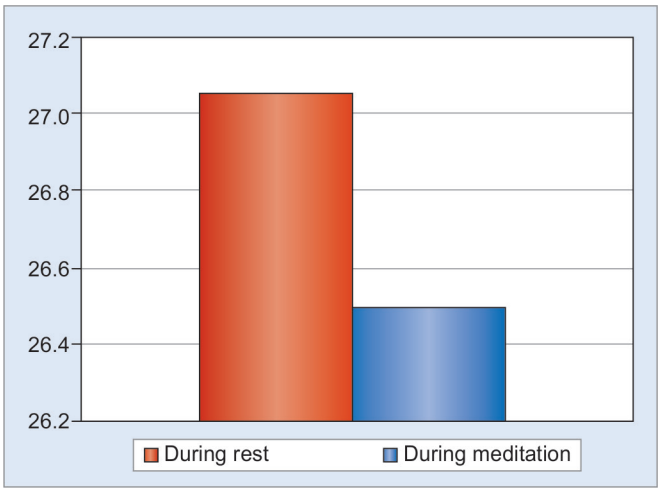

Fig. 4: Low frequency during rest and meditation

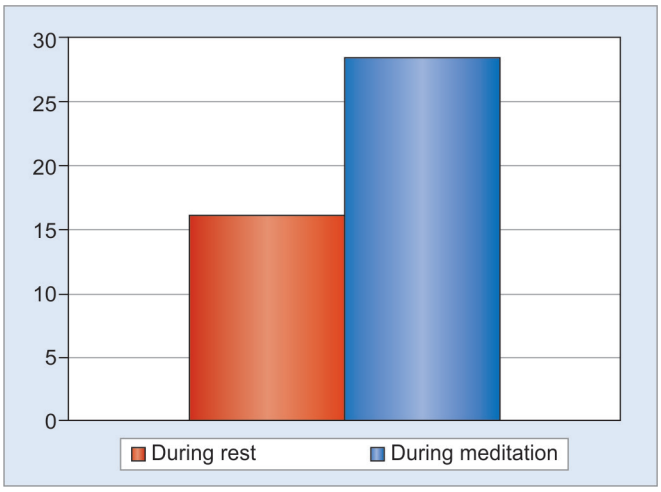

Fig. 5: High frequency during rest and meditation

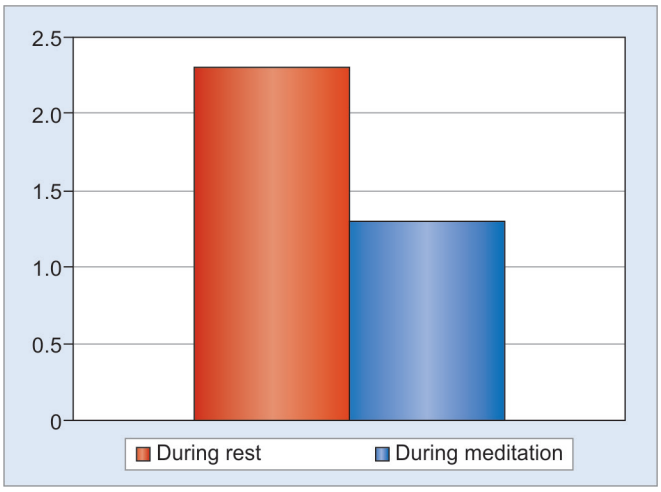

Fig. 6: Low frequency/high frequenc ratio during rest and meditation

16.2383 ± 11.1896 to 28.4875 ± 14.51128779 during meditation, with p-value <0.01 (Table 1 and Fig. 5). The LF/HF ratio decreased significantly from 2.308001 ± 1.346381 during rest to 1.310721 ± 1.20004 during meditation, with p-value <0.01 (Table 1 and Fig. 6).

DISCUSSION

The study shows increase in the mean R–R interval after practice of SYM consistent with the findings of Nesvold et al[20] who studied HRV during nondirective meditation.

The outcome of the study has been found to be similar to various studies undertaken during meditation.[21-23] It suggests that decrease in the LF component and increase in HF component of HRV during meditation shifts the sympathovagal balance toward a reduction in sympathetic tone and enhanced parasympathetic tone. Thus, lower LF/HF ratio during meditation indicates enhanced parasympathetic modulation of HRV and better sympathovagal balance. Many studies with SYM in the treatment of anxiety, depression,[24] work stress,[25] hypertension and heart diseases,[26] asthma,[27] and seizure control and EEG changes in patients of epilepsy[28] have shown positive results.

Sahaja Yoga is a simple noncommercial meditative technique practiced for spiritual and mental well-being. The technique is simple and does not involve adoption of any complicated postures. It can be easily practiced by any person. The yogic tradition encourages aspirants to pursue the awakening of energy, traditionally known as "kundalini," that facilitates the achievement of the Sahaja state. The meditative experience is characterized by a sensation of normal, or even heightened, alertness in conjunction with a state of complete mental silence.[18] This is associated with a sense of relaxation and positive mood and a feeling of benevolence toward oneself and others. Meditation by the Sahaja Yoga technique is, according to tradition, an innately therapeutic process that is beneficial for a number of chronic diseases, mental and physical.

The exact mechanism by which Sahaja Yoga benefits HRV cannot be deciphered from the present study. Although classical yoga books attribute the positive effects of Sahaja Yoga to activation of "Kundalini," a hypothetical center of energy at the base of the spine, it is postulated that somehow the Sahaja state does modulate our autonomic nervous system, and through the connections of the latter with the hypothalamus, it may also regulate our neuroendocrine systems. As hypothalamus is also connected to reticular formation, Sahaja Yoga practice may inhibit reticular activating system by modulating inflow of sensory stimuli to it. This promotes alpha wave activity in the cerebral cortex that is conducive of a relaxed state of mind. Further research is required about the physiological basis of positive effect of SYM on our autonomic system.

CONCLUSION

The study indicates that the increase in HF component and decrease in LF/HF ratio during meditation significantly shifts sympathetic and parasympathetic balance toward parasympathetic side, and overall increase in HRV indicates better autonomic status. The lower LF/HF ratio in Sahaja Yoga group indicated a robust sympathovagal balance in yoga subjects. Also, higher levels of HF recorded in the yoga group indicated a parasympathetic dominant (relaxed) state of mind and body in Sahaja Yoga practitioners.

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40 years to give *en masse* self-realization to thousands of people, in more than 120 countries of the world, free of cost. We are thankful to all the Sahaja Yoga meditators for their active participation in the study on a voluntary basis.

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