ORIGINAL RESEARCH

An Interventional study to assess the effect of Pranayama on Heart rate variability among Healthy volunteers of Chamarajanajar district

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ABSTRACT

Background & objective: Yoga is an ancient Indian science practiced since a long time. Breathing exercises in yoga (Pranayama) is believed to have an impact on heart rate of an individual thereby strengthening the cardiac autonomic activity in both physiological & pathological conditions. Reduced heart rate variability (HRV) is considered as a predictor for increased risk of cardiac mortality. Therefore this study was conducted to assess effect of Pranayama on Heart rate variability among Healthy volunteers. **Objective:** To assess the impact of Pranayama on Heart rate variability among the healthy volunteers. **Materials & Methods:** This is a cross sectional study donein the department of Physiology Chamarajanagar Institute of medical sciences, Karnataka among 30 healthy volunteers. HRV was measured in a quiet room in supine position after 15mins of rest. The obtained data regarding the effect of Pranayama on the heart rate variability was tabulated. Statistical analysis was done using paired 't' test & Pearson's correlation was used to find out the significant association between Pranayama & HRV. **Results:** Heart rate variability was found to be higher among regular Pranayama practitioners. There was a significant correlation between duration of yoga practice and HRV. **Conclusion:** In this study, it was found that practicing Pranayama on a regular basis will have a beneficial effect on heart rate variability. The balance in the autonomic nervous system can be restored by improving the parasympathetic tone.

Key words: Pranayama, Heart rate variability (HRV), Yoga, Healthy volunteers.

INTRODUCTION

The word Yoga is derived from the Sanskrit word Yuj which means to Join, yoke or unite.[1]It is almost a 3000 year old ancient Indian science which involves practice of various postures and controlled breathing. A discipline which aims at creating sound health within the individual by bringing perfect harmony amongst physical, mental, emotional & spiritual aspects.[2]Main aim of Yoga is self-realization, to overcome all kinds of sufferings. People all over the world have embraced yoga as a way of life to reduce stress, to stay healthy & rejuvenated and also to overcome the psychiatric co-morbidities.

Pranayama is an integral part of yoga. The different techniques of Pranayama have unique quality & effect which have a lot of beneficial effect on the body.[3] Reduction of stress, anxiety, alleviation of fatigue, alteration in blood pressure, improvement of mental concentration, boosts in the immune system, strengthening of the respiratory system are some of the physiological changes that are expected among the individuals who practices Pranayama regularly. Pranayama is considered the best way to improve the mental & emotional well being.[4]

Heart rate variability, a measure of the difference in time between each heartbeat is usually controlled by

the autonomic nervous system (ANS). It has 2 components that are Sympathetic & parasympathetic nervous system. The signals that are transmitted from hypothalamus are carried to various organ systems by this ANS which regulates heart rate, blood pressure, digestion, and breathing.[5]There is a belief that regular practice of Pranayama (breathing exercises) tends to reduce the reactivity of the cardiovascular system to stress. There will be reduction of heart rate, blood pressure and autonomic over activity of the heart due tothe parasympathetic predominance with increase in vagal tone among the regular yoga practioners.[6]Therefore this study was carried out to find the effect of practicing Pranayama on the heart rate variability among the healthy volunteers.

OBJECTIVES

To assess the impact of Pranayama on Heart rate variability among the healthy volunteers.

METHODOLOGY

The study was conducted in a sample of thirtyhealthy volunteers in the department of Physiology, Chamarajanagar Institute of Medical Sciences.All the study participants belong to the age group from 25 – 40 years. Informed consent was taken from all the participants who volunteered for the study. The study was approved by Institutional Ethical Committee.

INCLUSION CRITERIA

1. Thirty normal healthy subjects between 25- 40 years.

EXCLUSION CRITERIA

1. History of consumption of alcohol/smoking.
2. History of sleep disorders
3. History of cardiac and respiratory illness
4. Hypertension
5. Diabetes mellitus
6. History of depressive disorders.

EXPERIMENTAL DESIGN

The subjects were selected by a detailed history & thorough physical examination.

ASSESSMENT

Heart rate & Heart rate variability was recordedbefore and after doing Pranayama among the study subjects. The participants were practicing Pranayama for min 15-20mins daily for a period of 45days. After practicingPranayama daily for 45days, HRV was recorded in supine position for 5 minutes by using CARDIART 8408 VIEW machine.

STATISTICAL ANALYSIS

The obtained data regarding the effect of Pranayama on the heart rate variability was tabulated. Statistical tests such as paired 't' test & Pearson correlation were used to find significant association between Pranayama & HRV. P value <0.05 is considered significant.

RESULTS

Heart rate variability was significantly higher in regular Pranayama practitioners. There was a positive correlation between HRV and duration of Pranayama practice. The mean SDNN after Pranayama was significantly higher compared to performing Pranayama. There was a significant association found between the variation in the mean SDNN before and after performing regular Pranayama.

Table: 1 - Comparison of mean SDNN before & after yoga

HRV	After Yoga	Before Yoga	P - Value
Mean SDNN	0.086±0.041	0.0341±0.082	**< 0.01**

Figure: 1 - Correlation between HRV (SDNN) & duration yoga

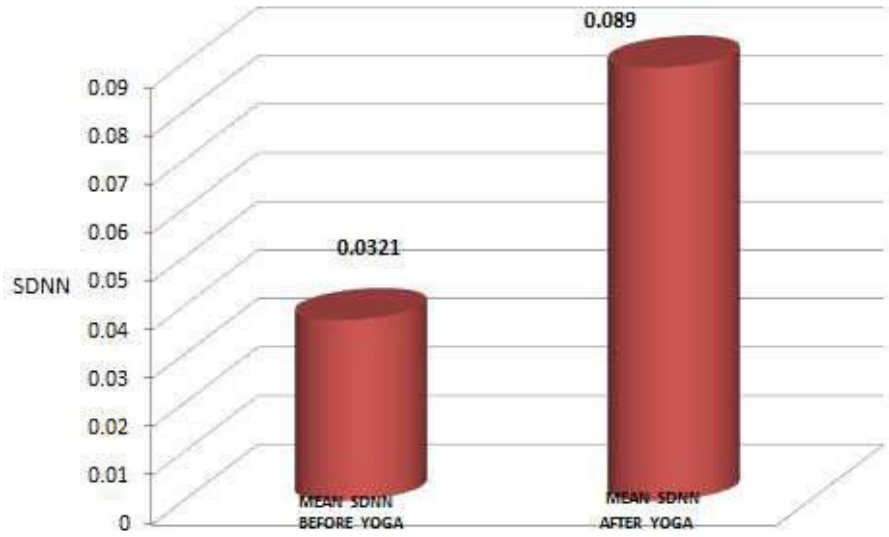
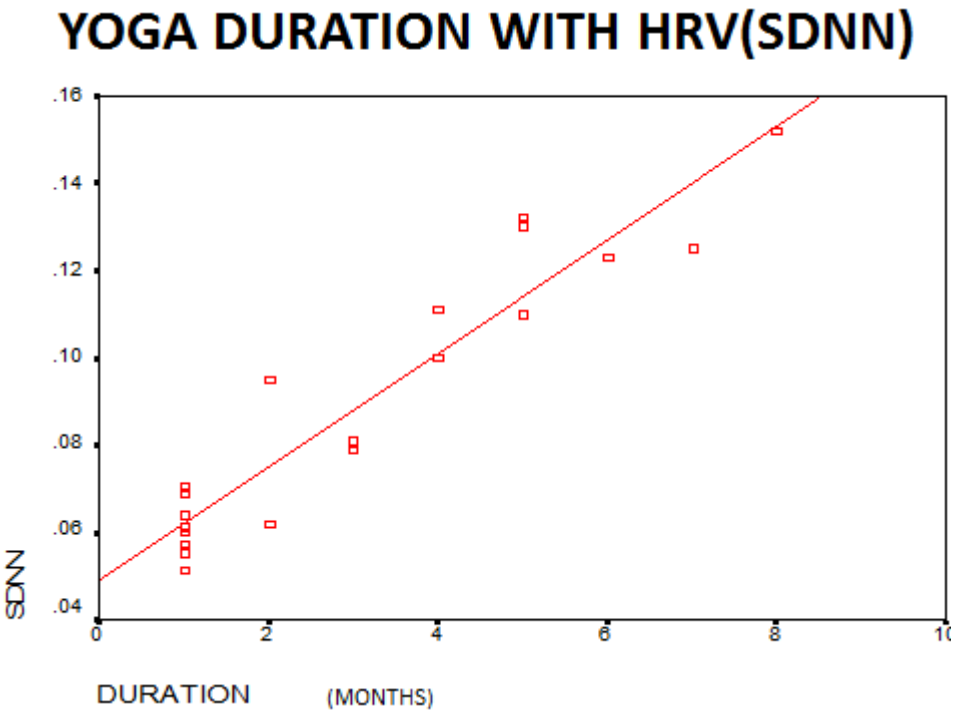


Figure: 2 - Correlation between HRV (SDNN) & duration yoga



DISCUSSION

In our study, it was found that HRV was significantly higher after performing Pranayama exercises among the study participants indicating the parasympathetic predominance. A similar finding was obtained in a study done by Sharp E et al [7]which demonstrated an increase in an index of cardiac parasympathetic tone during Pranayama. In a study of similar kind done by Patil S G et al[8]also found that the influence of the parasympathetic activity among the individuals who practice breathing exercises is high compared to those who do not practice the yoga regularly. In one more study done by Alaguveniet al[9]on effect of deep breathing exercises on heart rate variability also found that there was increase in HRV indicating parasympathetic dominance among those who practice deep breathing exercises for 6 months.In a study done by LalithaS et al[10]also found that there is parasympathetic domination among Pranayama practitioners and Heart rate & HRV variability are the most sensitive and easily accessible indicators of sympathetic and parasympathetic activity in autonomic regulation. In a study done by Bhaskar A et al[11]on role of yoga in improving Pulmonary efficiency also found that regular yogic exercise and Pranayama significantly showed the improvements in the respiratory parameters, which is almost similar to the finding of our study.

CONCLUSION

The present study suggests that regular practice of Pranayama has a beneficial effect on autonomic functioning of the Heart by increasing the parasympathetic dominance. Practicing Yoga especially the breathing exercises regularly should be advocated to the people to improve the health and quality of life. Even Pranayama can be used as intervention during cardiac rehabilitation & thereby decrease cardiac mortality.

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