

A Study on Effect of Cyclic Meditation on Heart Rate Variability in Young Healthy Adults

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ABSTRACT:

Yoga is an ancient Indian practice that combines physical and mental activities to achieve mental and bodily calm which leads to a state of relaxation beneficial for stress and anxiety management. Cyclic meditation which is named as moving meditation taken from the Mandukiya upanishad is a hybrid of yoga postures and guided meditation which includes instant, quick and deep relaxation techniques. The aim of trial was to study the effect of cyclic mediation on Heart rate variability in Young healthy adults. This is an interventional study which includes young adults of both gender in the age group of 20-30 years selected from JSS Medical college. The study was done after obtaining ethical clearance from the ethical committee of JSS Medical college, Mysuru. Screening of 100 subjects were done and among them 34 were selected. The subjects were briefed about the purpose of study and protocol was explained. Informed consent was taken from all of them. HRV and BP were measured before and after CM in each of them. The collected data was entered into MS Excel followed by the analysis using SPSS version 22. The comparison of HRV and BP before and after cyclic meditation were done using paired sample t test. A P value of <0.05 was considered statistically significant. Average HR is decreased after the practice of CM in the participants (81 vs 77). The LF/HF ratio decreased (0.15 to 0.12), pNN50 increased (9.28 to 29.46), TP (4646.6 to 5658.6) increased after the intervention. Comparison of blood pressure showed that both SBP (116 to 106) and DBP(76 to 69) decreased after the practice of CM. The results of the study, shows that CM session is associated with increased parasympathetic activity and a corresponding shift in sympathovagal balance as reflected in LF /HF ratio. Hence CM is one of the best alternative for stress relieving.

KEY WORDS: Ayurveda, Blood Pressure, Heart rate, Meditation, Pulse Rate, Yoga,

Received: 02.11.2022 Revised: 16.12.2022 Accepted:19.12.2022 Published: 20.12.2022

Quick Response code



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INTRODUCTION:

Yoga is an ancient Indian practice that combines physical and mental activities to achieve mental and bodily calm which leads to a state of relaxation beneficial for stress and anxiety management. It is a diverse science that encompasses a variety of postures, breathing exercises and meditation practices. Meditation seventh stage out of eight stages Yoga. [1,2] Cyclic meditation which is named as moving meditation taken from the Mandukiya upanishad is a hybrid of yoga postures and guided meditation which includes instant, quick and deep relaxation techniques. [3] It implies that such a mixture is beneficial for achieving mental balance. Yoga postures are practiced in cyclic meditation with times of relaxation in shavasana in between. When compared to an equivalent length of shavasana, substantial reductions in oxygen usage occur after the practice session. Cyclic meditation has been proven to be very helpful in reducing stress, and it is extensively used in stress management programmes for professionals. It is worth noting that Cyclic meditation does produce a calm state of mind which is consistent with the definition of meditation. [4-5] Recent research on Cyclic meditation reveal that sympathetic activation is predominate during the yoga posture phase, but the parasympathetic nervous system takes over following cyclic meditation. It has also been shown to improve attention and short-term memory. [5] The goal of this study is to evaluate and compare the effects of yoga on the Heart rate variability and blood pressure in young adults.

MATERIALS AND METHODS:

This is an interventional study including young adults of both genders between the ages of 20 and 30, who were chosen from JSS Medical College. The study was conducted after receiving ethical approval from the JSS

Medical College Ethics Committee in Mysuru. A total of 100 participants were screened, with 34 participants were selected. In each of them, HRV and BP were assessed before and after CM. The goal of the study was presented to the subjects, as well as the methodology. Informed consent was taken from all of them.

Objective parameters: Weight, Height, BMI (body mass index), Heart rate, HRV, BP (blood pressure).

Non-obese young adults**Inclusion criteria:**

The subjects of BMI (Body Mass Index): 18.5 to 23(normal) + 23.1 to 24.9(overweight)kg/m² in the age group 20-30 years were included in this trial. The non-smokers, non-alcoholic and no history of acute / chronic illness were included in this study.

Exclusion criteria:

The subjects of BMI (Body Mass Index):25 to 30kg/m² and above with age group of more than 60 years or less than 30 years were excluded. The subjects having tobacco users and alcoholics and acute or chronic illness history were excluded from study.

Materials

- HRV Machine for measuring heart rate variability (Niviqure)
- Automated Sphygmomanometer for measuring blood pressure.
- Stadiometer and weighing machine for Height and Weight measurement respectively.
- Handgrip dynamometer
- Ice cold water
- Yoga mat

Methodology:

- Each subject's weight and height were measured. The subject's body weight was determined by standing stationary

on the weighing scale with the weight evenly distributed on each leg.

- Body mass index was computed for each participant using Quetelet's formula with the subject standing vertically against a wall and the top of the external auditory meatus should be level with the inferior margin of the bony orbit when the head is in this position

Body Mass Index (BMI): $\frac{\text{Weight in kilograms}}{\text{Height in meters square}}$

I) Baseline recording of Heart rate and Blood pressure:

1) Supine Rest

The subject was instructed to rest for 20 minutes in a supine position. In both groups, baseline HR and BP were collected using an HRV machine and an automated sphygmomanometer accessible in the physiology department, and HRV was evaluated.

II) Yoga Intervention

Cyclic Meditation: Volunteers were informed to attend CM classes conducted by the Department of Yoga. They were explained about the whole process of cyclic meditation including the benefits and also the pre and post effects of CM using the mentioned parameters. The sequence of CM is followed as follow:

Instant relaxation technique (IRT)

- a. Standing up from left side
- b. Linear awareness
- c. Relaxation and centering in tadasana
- d. Ardhakati chakrasana
- e. Pada hastasana

- f. Ardha chakrasana
- g. Coming down to savasana from right side

Quick relaxation technique (QRT)

- a. Raising up straight (with the support of elbow and palms)
- b. Relaxing in leg stretch sitting pose.
- c. Vajrasana.
- d. Sasankasana and return to Vajrasana.
- e. Ustrasana or Ardha Ustrasana.
- f. Relaxing in leg stretch sitting pose.
- g. Going straight back (with support of elbows and palms).

Deep relaxation technique (DRT)

- a. Coming up straight (without support)
- b. Any comfortable sitting position (Vajrasana preferred)

Statistical analysis:

The data was entered into MS Excel, and then SPSS version 22 was used to analyse it. Arithmetic mean, Standard deviation, and percentages are used to express demographic information such as age and gender, as well as variables such as height, weight, and BMI. The paired sample to compare two groups, the t test was utilised. HRV and BP before and after cyclic meditation. The difference between obese and non-obese people was compared using a t test with an independent sample. A 0.05 significant p value was utilised.

Results:

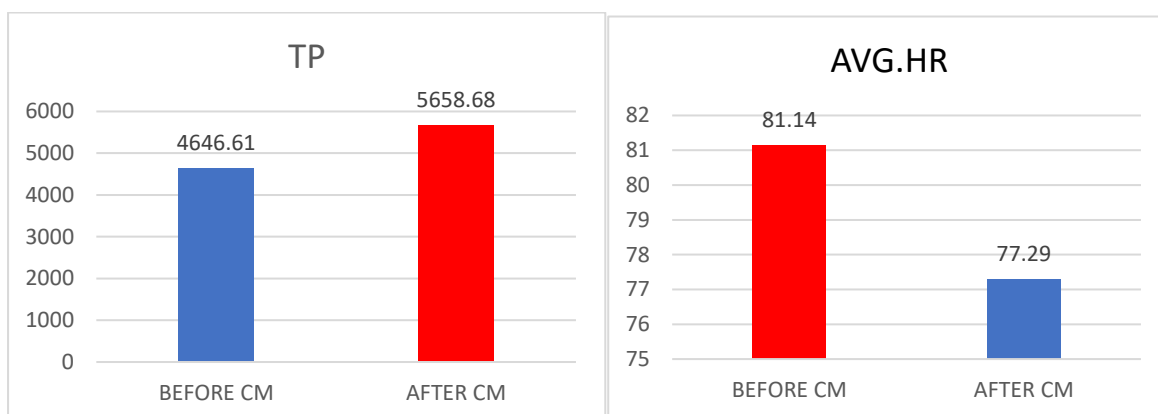
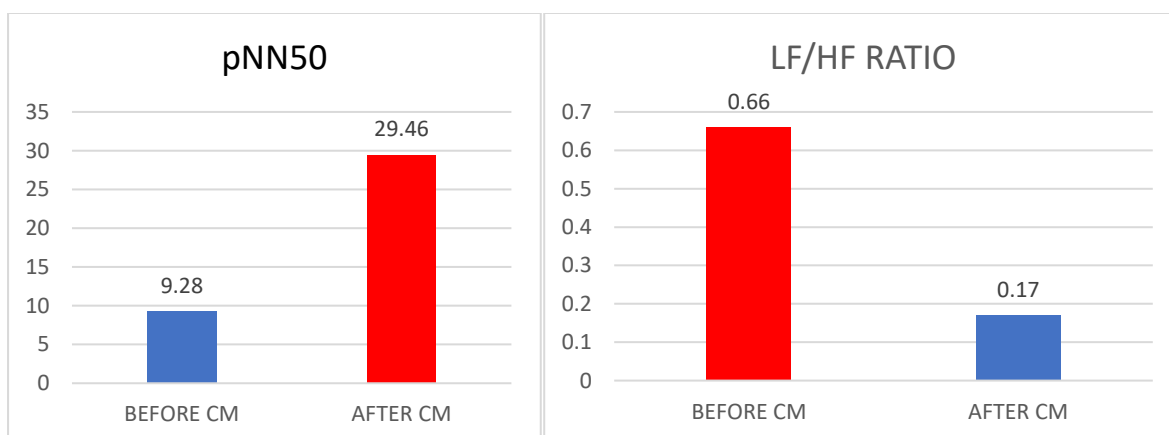
There was a total of 34 participants. Their HRV, SBP & DBP before and after CM was analysed in separate groups. The HRV parameters included average HR, TP, LF/HF ratio and pNN50 (Table1,2 and Graph 1,2,3)

Study of variables in non-obese group

Table 1: Comparison of HRV in non-obese before and after CM

Parameters	Before CM (MEAN±SD)	After CM (MEAN±SD)	Significance
AVG.HR	81.14±11.92	77.29±11.85	<0.02*
TP	4646.61±881.3	5658.68±1852.8	<0.1
LF/HF RATIO	0.66±0.35	0.17±0.06	<0.02*
pNN50	9.28±4.18	29.46±4.05	<0.02*

p value<0.05= significant*


Graph 1: Comparison of HRV in non-obese before and after CM

Graph 2: Comparison of HRV in non-obese before and after CM

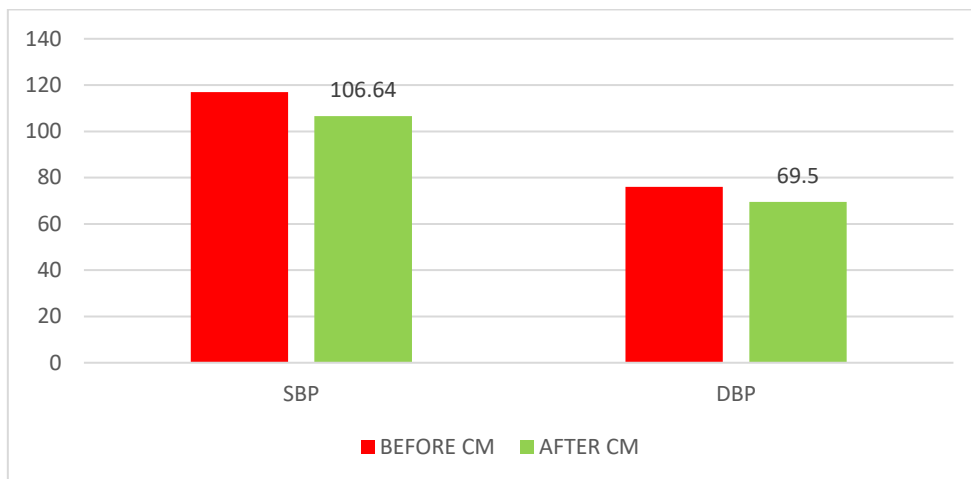
Comparison of blood pressure in non-obese before and after CM

Table 2: Comparison of BP in non-obese before and after CM

Variables	Before CM (MEAN±SD)	After CM (MEAN±SD)	Significance
SBP	116.91±9.04	106.64±11.22	<0.01*

DBP	76.029±9.76	69.5±9.62	<0.01*
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p value <0.05= significant*



Graph 3: Comparison of blood pressure in non-obese before and after CM

DISCUSSION:

The present study evaluated the changes in HRV before and after CM in non-obese young adults. The goal of this research was to discover if there is any change in the cardiac autonomic function following the practice of CM (yoga). As per our observation, average HR, LF/HF ratio is decreased after the practice of CM in Non-obese group. pNN50, increased after the intervention in both groups.

In healthy individuals, HF constitutes about 60% and LF constitutes about 40% of the TP of HRV. Therefore, the ratio of LF to HF less than 1 indicates good cardiovascular health. But it can varies from 0.5 to 1.5. Increased LF/HF ratio indicates increased sympathetic activity while a decrease in it indicates increase in parasympathetic activity.

In this study it was observed average HR, LF/HF ratio and pNN50 were significantly decreased following CM in non-obese. In non-obese, the mean ±SD HR was 81±11.92 before CM and 77±11.85 after CM. The mean ±SD TP was 4646.61±881.3 before CM and 5658.68±1852.8 after CM. The mean ±SD LF/HF ratio was 0.66±0.35 before CM and

0.17±0.06 after CM. The mean ±SD pNN50 ratio was 9.28±4.18 before CM and 29.46±4.05 after CM. The mean ±SD SBP was 116.91±9.04 before CM and 106.64±11.22 after CM. The mean ±SD DBP was 76.029±9.76 before CM and 69.5±9.62 after CM.

The LF strength and LF/HF ratio both decreased after CM, while the HF power rose. HRV changes during CM, which represent a change in favour of vagal domination, HRV variations after a low velocity are similar, low impact motion approach. Senior individuals in the study exhibited stronger vagal action and low sympathetic activity, according to the findings. [6]

Subramanya P and Telles S discovered that "practising CM had immediate benefits in reducing HR and BP" in their review of scientific papers on cyclic meditation. The HRV's LF band is mostly impacted by sympathetic modulation, whereas the HF band is primarily influenced by efferent vagal activation. The LF/HF ratio, which is a frequency domain, is associated to sympathovagal balance. Aside from that,

CM's practise has resulted in an increase in pNN50. [7] This temporal domain is discovered to be significantly connected to frequency domain metrics and is heavily influenced by vagal tone. Total autonomic activity is measured by HRV and TP. It's a signal's power intensity measured in the frequency domain. As a result, these frequency changes are occurring.

According to Ross A and Thomas S in their study on the health effects of yoga and exercise, which is a review of comparison studies, as a result of a shift in sympathovagal balance, Yoga positions are used to create the 'awakening' practises, while periods of supine rest are used to create the 'uplifting practices.' A crucial part of cyclic meditation practise is the state of being aware of one's own feelings that develop in body. This statement supports the hypothesis that "a mix of stimulating and calming procedures performed against a backdrop of relaxation and awareness (during CM) may diminish psycho physiological arousal more effectively than resting in a supine posture for the same length of time." Yoga postures that include muscular extending are a component of CM practise and provide a number of benefits. [7] K Umashankar and P Subramanya discovered that the "relaxation state in CM resulted in parasympathetic supremacy in T2DM patients as well, resulting in a reduction in LF constituent and marked improvement in HF domain and LF/HF ratio of HRV" in their study. [8]

In his study on yoga's impact on the nerve system's autonomic functions, Murugesan M discovered that "practicing yoga of cyclic meditation appears to change sympathetic activity balance in favour of parasympathetic predominance after CM." During Dhyana (meditation) and guided relaxation, the sympathetic nervous system's activity was decreased, indicating a

change in autonomic balance toward vagal dominance. [9]

Vempati, R., and P.Telles, S. discovered that guided relaxation based on yoga lowers sympathetic activation relative to starting levels in their study. 35 male participants ranging in age from 20 to 46 years old participated in two yoga-based guided relaxation and supine rest sessions. During guided relaxation, the low frequency decreased a component of the heart-rate variability spectrum in power, while the high frequency component rose in power, indicating less sympathetic activity. After guided relaxation, those with a baseline ratio of LF/HF > 0.5 had a significant drop in their ratio, whereas those with a ratio of or = 0.5 saw no change. Sympathetic activity decreased following yoga-based guided relaxation, depending on baseline levels, according to the findings. [10-14]

CM, which includes yoga-based guided relaxation, lowered LF power while boosting HF power. During a previous SR period, this was not the situation. Visual visualisation and muscular relaxation are two aspects of guided meditation that may have influenced the outcome. The entire process, on the other hand, is uncertain. Interoception, or the knowledge of one's own internal physical sensations, is another aspect of CM. As a result, the fact that CM combines mental imagery, muscular relaxation, and internal awareness might be related to the alterations associated with it. This shift is mostly due to a drop in cortical activity, which might affect hypothalamic activity. We discovered a favourable change in cardiac autonomic regulation towards parasympathetic predominance in healthy teens immediately after CM.

LIMITATIONS OF STUDY:

- The present study was done on only 68 subjects where, larger sample should have been used.

- Here in our study, we analysed immediate effect of CM on HRV.
- We tested for single session of CM, instead we can expect better result after 6 weeks of training.

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CONFLICT OF INTEREST: Author declares that there is no conflict of interest.

GUARANTOR: Corresponding author is guarantor of this article and its contents.

SOURCE OF SUPPORT: None

HOW TO CITE THIS ARTICLE:

Anupama V, Srinath CG, Sujana MU, Jahnavi V Madhu. A Study on Effect of Cyclic Meditation on Heart Rate Variability in Young Healthy Adults. *Int. J. AYUSH CaRe*. 2022; 6(4):443-449.