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Original Research Article

# Evaluating the Use of Relaxation Techniques in Reducing Stress Levels by Measuring Heart Rate Variability

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**Abstract**

**Aim:** The aim of the present study was to assess the use of Relaxation Techniques in Reducing Stress Levels by Measuring Heart Rate Variability at tertiary health care center.

**Methods:** This was a retrospective study carried out in the apparently normal individuals to study the effect of various relaxation techniques like Breath focus, Body scan, Guided imagery, Mindfulness meditation, Yoga, Taichi, and qigong, Repetitive prayer etc. on heart rate variability in the Department of Physiology, Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India . There were 100 individuals who given written consent to be part of the study.

**Results:** The average age in both the age group was 36± 3.97 and 34± 4.26 was not statistically significant ($p>0.05$). The baseline parameters in both the groups were comparable ($p>0.05$) but the HRV after 12 weeks therapy High Frequency HRV increased in Group A as compared to Group B was significant ($P<0.05$); The Low frequency waves increased in Group B as compared to Group A ($p<0.05$) decreased Low frequency HRV and LF/HF ration after 12 weeks intervention was statistically significant ($P<0.05$).

**Conclusion:** It can be concluded from our study that after 12 weeks training with various relaxations techniques the autonomic function measured by HRV i.e. High frequency Increased and low frequency decreased hence the parasympathetic dominance increased with the relaxations techniques.

**Keywords:** Relaxation Techniques, Heart Rate Variability (HRV), Autonomic Function Of Heart.



## Introduction

A state of physiological and psychological imbalance is known as stress occurs when a person perceives the situation demands to be greater than their ability to satisfy it. It is the natural reaction to an unexpected incident that happens in a person's life. This reaction may be mental, physical, or emotional. [1] According to medical definitions, stress occurs when a person perceives a situation as threatening and their body responds accordingly. The body releases hormones to get ready for action. Increased blood pressure and heart rate enhanced blood flow to the muscle and heart. Reduced blood flow occurs in less critical areas, like the digestive system. Under stress, dizziness, palpitations, and nausea were reported. [2]

Stress can have both positive and negative effects on us. Positive stress can spur us to action, while negative stress can cause feelings of worry, discomfort, rage, and sadness that can worsen our mental and physical health. [3] Various relaxation techniques that include practices such as progressive muscle relaxation, deep breathing exercises, and mindfulness meditation are used to relax and reduce a person's stress and anxiety. The short-term physiological relaxation response is regulated by two branches of the autonomic nervous system (ANS). The parasympathetic branch of the ANS is more active while resting and therefore, its activation reduces physiological arousal. The sympathetic branch of ANS is more active during emergency reactions and promotes physiological arousal. [4] Relaxation is the ability of the human body to reduce the physiological arousal that manifests itself in the human body through a less activated sympathetic branch, decreased muscle tension, diminished heart rate, lowered respiration rate, increased skin temperature, and decreased sweating. [5]

Various relaxation techniques use different instructions and training to elicit a relaxation response. A deep breathing exercise procedure is based on breathing at controlled rates, particularly at 6 breaths/minute [6] whereas when applying a cognitive relaxation technique, people are asked to engage in relaxation strategies such as reliving one's pleasant memories or replaying one's favorite song internally for a period of 15–20 min. [7] Mindfulness meditation strategies refer to focusing one's attention in a non-judgmental manner to experiences that exist in the present moment—this may include focusing on breath, body scan, and mindful walking. [8,9]

The aim of the present study was to assess the use of Relaxation Techniques in Reducing Stress Levels by Measuring Heart Rate Variability at tertiary health care center.

## Materials and Methods

This was a retrospective study carried out in the apparently normal individuals to study the effect of various relaxation techniques like Breath focus, Body scan, Guided imagery, Mindfulness meditation, Yoga, Taichi, and qigong, Repetitive prayer etc. on heart rate variability in the Department of Physiology, Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India for two years. There were 100 individuals who given written consent to be part of the study so these participants randomly divided into two groups Group A (n=50, Receiving relaxation techniques) and Group B (n=50, Control). All necessary details like age, sex. HRV analysis was derived by ECG machine. The parameters were compared in both groups at baseline (by paired t-test) and after 12 weeks and in Group E and Group Y at the end of 12 weeks was by unpaired t-test calculated by SPSS 19 version software.

## Results

**Table 1: Distribution of the patient's as per age and sex**

| | Group Y (n=50) | Group E (n=50) | p-value |
|---|---|---|---|
| **Average age (Mean ± SD)** | 36± 3.97 | 34± 4.26 | >0.05 |
| **Sex**<br>**Male** | 36 | 34 | >0.05 |
| **Female** | 14 | 16 | |

The average age in both the age group was 36± 3.97 and 34± 4.26 was not statistically significant (p>0.05).

**Table 2: Distribution of the study subjects as per the HRV**

| | Group A | | Group B | | p-value |
|---|---|---|---|---|---|
| | **Basal** | **After 12 weeks** | **Basal** | **After 12 weeks** | |
| HF (nu) | 51.19± 17.13 | 57± 4.96 | 55.59± 8.62 | 42.38 ± 21.88 | P<0.05 |
| LF (nu) | 43.97 ± 9.81 | 36.64± 8.72 | 38.72 ± 5.40 | 53.15 ± 14.86 | P<0.005 |
| LF/ HF | 1.22 ± 0.64 | 0.34 ± 0.17 | 1.08± 0.42 | 3.47 ± 1.73 | P<0.01 |
| SDNN (ms) | 38.72±5.85 | 48± 12.72 | 58.22 ± 12.62 | 37± 3.77 | p>0.05 |

The baseline parameters in both the groups were comparable (p>0.05) but the HRV after 12 weeks therapy High Frequency HRV increased in Group A as compared to Group B was significant (P<0.05); The Low frequency waves increased in Group B as compared to Group A (p<0.05) decreased Low frequency HRV and LF/HF ration after 12 weeks intervention was statistically significant (P<0.05).

## Discussion

Yoga is an ancient science originated in India. It includes diverse practices, such as physical postures, regulated breathing, instructed relaxation and meditation. [10] Among the yoga based relaxation techniques, Deep relaxation technique (DRT), Cyclic meditation (CM), Shavasana are most popular. Practicing relaxation has earned popularity in Bangladesh. Recently, relaxation has come in limelight because of its cardiac and multisystem benefits among the practitioners. [11-14]

The average age in both the age group was 36± 3.97 and 34± 4.26 was not statistically significant (p>0.05). The baseline parameters in both the groups were comparable (p>0.05) but the HRV after 12 weeks therapy High Frequency HRV increased in Group A as compared to Group B was significant (P<0.05); The Low frequency waves increased in Group B as compared to Group A (p<0.05) decreased Low frequency HRV and LF/HF ration after 12 weeks intervention was statistically significant (P<0.05). A number of studies using existing stress measurement methods (e.g., psychological measures of stress) and examining biological markers (e.g., cortisol, amylase) have been performed. Moreover, studies on heart rate variability (HRV) and stress are increasing in frequency. HRV is the fluctuation of the length of heart beat intervals. [15] HRV represents the ability of the heart to respond to a variety of physiological and environmental stimuli. [16] Low HRV conveys a monotonously regular heart rate. Moreover, low HRV is associated with impaired regulatory and homeostatic autonomic

nervous system (ANS) functions, which reduce the body's ability to cope with internal and external stressors.

In view of observations of stress-associated variation in HRV and existing neurobiological evidence, HRV may be used as an objective assessment of stress and mental health. However, since psychiatric illnesses have numerous causes and symptoms, consistent biological measurements are difficult to acquire in individuals with mental illness. Thus, a patient's psychological and medical history should be equally considered when interpreting HRV results. Therefore, HRV can be considered a tool that reflects heart activity and overall autonomic health, rather than specific mental illnesses or disease states. Since the concept of stress includes biological and psychological factors, objective and physiological evaluations as well as self-reporting should be integrated when evaluating stress, using HRV in clinical practice. Many physical conditions and lifestyle habits can affect HRV results, including physiological factors (e.g., breathing, circadian rhythms, and posture), non-modifiable factors (e.g., age, sex, and genetic factors), modifiable lifestyle factors (e.g., obesity, metabolic syndrome, physical activity, smoking, and drinking), and other factors [e.g., medication (e.g., anticholinergics, stimulants, and beta-blockers)]. [17,18] Hans Seyle[19] proposed a three-stage stress response model. The first stage is the "alarm reaction stage," in which the body reacts to a stressor with the fight-or-flight response and activates the SNS. The second stage is the "resistance stage," in which the body adapts to the stressor. During this stage, the PNS restores many physiological functions to normal, while the body focuses its resources against the stressor.

## Conclusion

It can be concluded from our study that after 12 weeks training with various relaxations techniques the autonomic function measured by HRV i.e. High frequency Increased and low frequency decreased hence the parasympathetic dominance increased with the relaxations techniques.

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