

# A Study to Compare the Effect of Raj Yoga and Progressive Muscle Relaxation on Cardio Respiratory Parameters in Indian Females of Reproductive Age Group

Dr. Arunima Chaudhuri<sup>1</sup>, Dr. Moumita Ghar<sup>2</sup>

<sup>1</sup>Associate Professor Department of Physiology, Rampurhat Government Medical College and Hospital (Affiliated to West Bengal University of Health Sciences), Rampurhat, West Bengal, India.

<sup>2</sup>Ex-Resident Department of Physiology, Burdwan Medical College and Hospital, Burdwan, West Bengal, India.

Corresponding Author: Dr. Arunima Chaudhuri

## ABSTRACT

**Background:** Indian females of specifically of reproductive age are highly stressed as they have to play multiple roles in the society and perceived stress may negatively affect cardio respiratory functions by altering cardiovascular reactivity.

**Aims:** To compare the effect of Raj yoga and Progressive Muscle Relaxation on cardio respiratory parameters in Indian Females of reproductive age group.

**Materials and methods:** The present study was conducted in Burdwan Medical College after taking institutional ethical clearance and informed consent of the subjects. Hundred healthy females in the reproductive age group performing RAJYOGA regularly and hundred healthy females in the reproductive age group performing Progressive muscle relaxation regularly at least for 3 months were selected from the local population. The group practicing Raj yoga was termed as Meditators and the other group as PMR practitioners. Stress level in the subjects was assessed according to the Presumptive stressful life event scale (PSLES). The Perceived Stress Scale (PSS) of Sheldon Cohen was used to measure perceived stress scores. Anthropometric measurements, resting pulse rate and blood pressure, Valsalva ratio were recorded, followed by analysis of lipid profile, Pulmonary function tests.

**Results:** Both the groups were age matched and their food habits were comparable. Their PSLES scores showed no significant difference. PSS, BMI and waist/ hip ratio of both the groups practicing relaxation exercises were comparable. There was no significant difference in resting pulse rate, systolic blood pressure, diastolic blood pressure, Valsalva ratio, lipid profile, Pulmonary function tests between the two groups practicing raj yoga and PMR.

**Conclusions:** Progressive muscle relaxation is easy to learn and Practice. Raj yoga meditation as well as PMR are equally effective in reducing perceived stress in females of reproductive age group and thereby may decrease stress related morbidity and mortality in this group of population.

**Keywords:** Raj Yoga, PMR, PSS, Cardio respiratory profile.

## INTRODUCTION

The modern world is facing a pandemic of lifestyle disorders that require changes to be made consciously by individuals themselves, and stress

management strategies are the best lifestyle ever designed, that have potential in the prevention, management, and rehabilitation of prevalent lifestyle disorders. [1] The majority of studies on stress management

programmes and cardiovascular and metabolic health show positive trends. [1]

They help humans in the following ways: [1]

- To strengthen themselves
- Develop positive health
- To withstand stress better.

Though '2001' was declared as the "women's empowerment year", even in 21st century gender inequality still exists. Status of women in India is inferior to status of men. There are so many women, who silently bear the harassment from their life partners because of the lack of education, lack of legal awareness and lack of empowerment. In a society where women are empowered, the whole society enjoys the benefits. Educating women on health care promotes healthier families. Even though a woman works throughout the day to raise her children and maintains her family, she gets no recognition for her work. Unless the condition and status of women in society is improved there no chance of the welfare of women in the world. According to Swami Vivekananda "It is not possible for a bird to fly on one wing."- So a society cannot move ahead without the welfare of the female population. [2]

Some challenges faced by modern women in daily lives are as follows: [3-4]

1. Female Foeticide;
2. Dowry;
3. Restriction on widow remarriage;
4. Gender Bias;
5. Neglect during childhood;
6. Childhood marriages;
7. Gender specific specialization at work;
8. Cultural definition of appropriate gender roles;
9. Belief in the inherent superiority of males;
10. Families are considered as a private sphere and stays under male control;
11. Limited access to cash and credit;
12. Limited employment opportunities;
13. Limited access to education;
14. Female infanticide;
15. Poverty affects women more than men;

India's maternal mortality is highest in South Asia; Domestic violence; Crimes against women; Honor killings – Family

honor is associated with women in general, which is an extra burden on women; Trafficking of women; Lack of awareness about government schemes. [3-4] All these factors add extra stress to life. [5]

Stress coping methods are the cognitive, behavioral and psychological efforts to deal with stress. Relaxation must be attempted in order to reduce pain or pain perception and tension, create a pleasant mental state, reduce anticipatory anxiety, reduce anxiety as a response to stress, increase parasympathetic activities, increase knowledge concerning muscle tension and autonomous stimuli, improve concentration, increase the feeling of control, improve the ability to block inner talk, energize and improve sleep, decrease the cardiac index, lower blood pressure, warm or cool body parts, enhance performance of physical activities and help in the relationship with others. [2]

Yoga is finding increasing acceptance as a non-pharmacological intervention for the prevention and treatment of several diseases. [2] Yoga, a 3000years old tradition, is now regarded as a Complementary and Alternative Medicine in western world. Raj yoga works at the mental level. The idea behind meditation is to consciously relax one's own body and focus thoughts on one thing for a sustained period. This occupies mind diverting it from problems causing stress and gives body time to relax to clear away stress hormones. This simple but efficient relaxation technique tilts the autonomic response towards parasympathetic one resulting in beneficial effect on almost all systems of our body. [6-7]

Yoga, meditation, hypnosis may help to reduce stress levels, these techniques need professional supervision and training, but progressive muscle relaxation (a technique developed by Edmund Jacobson) [1] though a recognized method for reduction of stress and anxiety is easy to learn and it requires no constant guidance. Once the individual learns the correct way of doing PMR he/she can continue doing it to relieve the tension in the muscles. Muscle tension

accompanies anxiety; a person can reduce anxiety by learning how to relax the muscular tension. [1] PMR has gained huge popularity as an effective tool in various health conditions. [1]

It has been found in previous studies that women are affected more by stressors as compared to men and women between 25-55 years perceive highest amount of stress as they have to play multiple roles in the society. [5] Women in emerging economics and social markets are also more stressed as compared to women living in developed countries. So the present study was conducted in this population. [5] In 2011, [8] a study was conducted to compare two relaxation techniques: biofeedback assisted autogenic relation and progressive muscle relaxation. Both were found to be equally effective in improving moods of young football players. The present study was conducted to compare the effect of Raj yoga and Progressive Muscle Relaxation on cardio respiratory parameters in Indian Females of reproductive age group.

## MATERIALS AND METHODS

The present study was conducted in the department of Physiology of Burdwan Medical College after taking institutional ethical clearance and informed consent of the subjects. Hundred healthy females in the reproductive age group performing RAJYOGA regularly and hundred healthy females in the reproductive age group performing Progressive muscle relaxation regularly for at least 3 months were selected from the local population. The group practicing Raj yoga was named as Meditators and the other group as PMR practitioners.

**Inclusion criteria:** Subjects in the reproductive age group practicing Raj yoga in Prajapita Brambhakumari Iswariyamaha Mahabidyalaya, Burdwan for at least 3 months and age matched subjects practicing PMR for the same duration in the department of Physiology in Burdwan were selected.

**Exclusion criteria:** Subjects known to have any cardio respiratory disease or systemic illness, sports personnel, persons on antipsychotics, subjects practicing any other forms of yoga, people taking any medications that may alter autonomic reflexes, subjects with history of major illness in the recent past, pregnant, puerperal, lactating mothers were excluded.

On first appointment, particulars of the subject, personal history, food habit, family history, history of past illness and treatment history of the subjects were carefully recorded. Subjects were asked to tally a list of 51 life events based on a relative score. Stress level in the subjects was assessed according to the Presumptive stressful life event scale (PSLES). [9] Accordingly, they were categorized into no stress, less/moderate stress and severe stress. Score Stress up to 40: No stress; 41-200 Less/moderate stress; More than 200 severe stresses. Finally, 200 subjects with scores above 200 were chosen for the study group, as they had higher risk of developing illness. [9] The subjects were grouped into two: - **Meditators and PMR practitioners** with 100 subjects in each group.

The Perceived Stress Scale (PSS) of Sheldon Cohen, [10] the most widely used psychological instrument for measuring the perception of stress, was used to measure perceived stress scores. It is a measure of the degree to which situations in one's life are appraised to be stressful. Items were designed to find how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The questions in the PSS ask about feelings and thoughts during the last month. It comprises of 10 items, four of which are reverse-scored, measured on a 5-point scale from 0 to 4. PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) to the four positively stated items (items 4, 5, 7, and 8) and then summing across all scale items. Total score ranges from 0 to 40. [10]

General physical examinations were done and written consent was taken. Pre-test instructions were given to avoid consumption of any drugs that may alter the Cardio respiratory parameters 48 hours prior to the test. The subjects were advised for a good restful sleep. On the day of the test, no cigarette, nicotine, coffee, or drugs were permitted. Life event stress and perceived stress scores of the subjects were measured by using PSLES and PSS respectively.

Weight and height were measured, BMI and waist/hip were calculated.

Resting Pulse and blood pressure were measured.

Blood samples were drawn from subjects by sterile needle and syringes and sent to biochemical laboratory in sterile vials for analysis of Lipid profile.

Increased sympathetic activity has been observed during the premenstrual phase and this was positively correlated with the stress levels in previous studies.<sup>[11]</sup> To avoid stress effects of the premenstrual phase, we examined our subjects during the postmenstrual phase.

#### **Heart rate response to Valsalva maneuver (VR):**

The subject was instructed to exhale forcefully through the mouth piece of a modified mercurial sphygmomanometer and to maintain pressure in the manometer up to 40 mmHg for 15 seconds. ECG recording were taken during the maneuver and continued for about 30 seconds after the performance. The ratio of the longest RR interval after blowing to the shortest RR interval during blowing was calculated.

#### **Pulmonary function test**

**Apparatus:** Computerised spirometer, Helios 401

**Procedure:** The subjects were asked to sit comfortably on a chair. After taking normal breathing for a minute they were asked to inspire as deeply and as fully as possible to fill the lungs. Then keeping the nostrils closed by nose clip the mouth piece of the transducer held firmly between the lips. Then they were asked to expel all the air

that he can with maximum effort through the mouth piece of the transducer. Now the computer graphically displayed the results. The procedure was done for two more times for each patient. The best one was taken as result. FVC, FEV1, FEV1-FVC ratio were taken as parameters of pulmonary function test.

**Statistical analysis:** The computer software “Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.) was used to analyse the data. The difference between the groups was considered significant and highly significant if the analysed probability values (*P* value) were  $P < 0.05^*$  and  $P < 0.01^{**}$ , respectively.

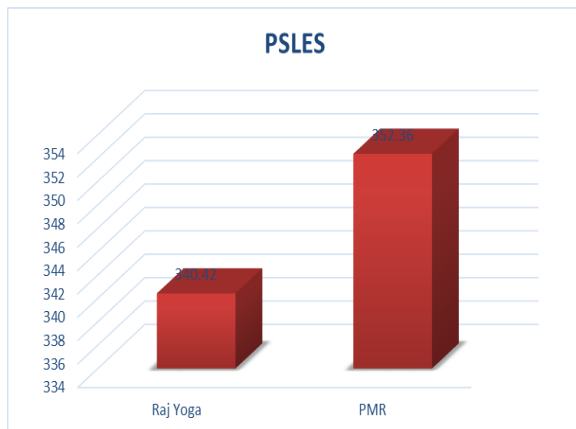
## **RESULTS**

Hundred healthy females in the reproductive age group performing RAJYOGA regularly and hundred healthy females in the reproductive age group performing Progressive muscle relaxation regularly at least for 3 months were selected from the local population. The group practicing Raj yoga was named as Meditators and the other group as PMR practitioners. Stress level in the subjects was assessed using PSLES. The Perceived Stress Scale (PSS) of Sheldon Cohen was used to measure perceived stress scores. Anthropometric measurements, resting pulse rate and blood pressure, Valsalva ratio were recorded, followed by analysis of lipid profile, Pulmonary function tests. Both the groups were age ( $25.9 \pm 4.6$  vs.  $25.8 \pm 4.68$ ; *P* value 0.93) matched and their food habits were comparable. Their presumptive life event stress scale showed no significant difference ( $340.42 \pm 55.52$  vs.  $352.36 \pm 49.76$ ; *P* value 0.74) (Figure 1). PSS (Figure 2), BMI and waist/ hip ratio of both the groups practicing relaxation exercises were comparable. There was no significant difference in resting pulse rate, systolic blood pressure, diastolic blood pressure, Valsalva ratio, lipid profile, Pulmonary function tests between the two groups practicing raj yoga and PMR (Table 1)

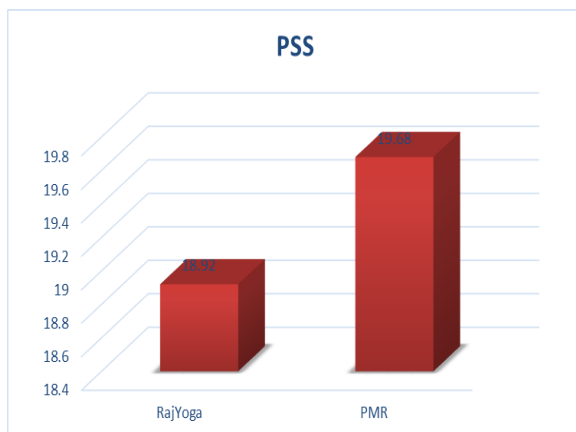
**Table 1: Comparison of different parameters of Meditators and PMR practitioners**

PARAMETERS	MEDITATORS	PMR PRACTITIONERS	p-value
AGE (Years)	25.9± 4.67	25.84 ± 4.68	0.93
PSS	18.92 ± 3.98	19.68 ± 3.4	0.84
PSLES	340.42 ± 55.52	352.36 ± 49.76	0.74
Waist/Hip ratio	0.98 ± 0.07	0.99 ± 0.08	0.29
BMI (kg /m <sup>2</sup> )	26.4± 2.9	27.1± 2.2	0.19
Pulse rate(beats/min)	80.2± 2.62	80.23± 2.61	0.7
SBP(mm of Hg)	122.8±9.5	122.2±8.6	0.168
Diastolic BP(mm of Hg)	82.44±1.63	81.52±3.03	0.063
Valsalva Ratio	1.39 ±0.09	1.414±0.01	0.690297
Cholesterol(mg/dl)	170± 10.2	172.7± 6.4	0.107
Triglyceride(mg/dl)	131.4± 7.1	132.1± 4.9	0.57
HDL(mg/dl)	49.2± 5.1	48.4± 4.7	0.399
LDL (mg/dl)	113.6± 5	114 ± 3.8	0.62
FVC	2.89 ± 0.84	2.94 ± 0.82	0.182
FEV1	2.38±0.8	2.45 ± 0.84	0.36
FEV1:FVC	82.57±5.64	83.60 ± 6.05	0.9

There was no significant difference in PSLES, PSS, BMI, waist/ hip ratio, resting pulse rate, systolic blood pressure, diastolic blood pressure, Valsalva ratio, lipid profile, Pulmonary function tests between the two groups practicing raj yoga and PMR.



**Figure 1: PSLES scores of both groups**



**Figure 2: PSS scores of both groups**

**DISCUSSION**

Progressive muscle relaxation is easy to learn and Practice. Raj yoga

meditation as well as PMR are equally effective in reducing perceived stress in females of reproductive age group and thereby decrease stress related hazards as is evident from the above results.

We had conducted a study in 2016 [12] to evaluate the effect of Raj yoga on stress management in healthy young adults. Hundred healthy young adults in the age group of 18 to 35 years performing RAJYOGA regularly were selected as study subjects and hundred age and sex matched subjects from the local population were chosen as control. Both the groups were age, sex matched and their food habits were same. Their PSLES scores showed no significant difference but perceived stress scores were significantly higher in case of Non-Meditators. BMI and waist/ hip ratio were significantly more in Non-Meditators. Resting pulse rate, Systolic blood pressure and diastolic blood pressure were significantly lower in Meditators. Results of Orthostatic tolerance test, Isometric hand grip test, showed significantly lower values in Meditators. Results of 40 mm endurance test were significantly raised in Meditators. In the present study only females were included and two relaxation techniques were compared.

Mindfulness along with breathing has long being considered a well-established meditation technique. Anapanasati meditation is a meditation in which an individual obtains mastery over one's unruly mind through objective observation of one's

own natural and normal breath. A study by Deo G et al in 2015 [13] was aimed at measuring changes in the different parameters of electrophotonic imaging (EPI) in anapanasati meditators. The measurement of EPI is based on the electrical activity of the human organism. There exists a gross difference this activity between diseased and healthy individuals. The biophysical principles in this investigation are based on the ideas of quantum biophysics. This method draws stimulated electrons and photons from the surface of the skin under the influence of a pulsed electromagnetic field. This process has been well-studied through "photoelectron emission." This method of assessment is quite different from normal electrophysiological methods, such as EKG and EEG. EPI parameters are a measure of induced electron availability in organs.

The EPI effect occurs when an object is placed on a glass plate and stimulated with the high-frequency high-voltage; a visible glow occurs around the object, which is the gas discharge. This glow is quantifiable and reproducible for scientific research purposes. In a normal experiment, the fingertip images are collected individually and used for analysis. Images captured from all 10 fingers provide detailed information about the person's psychosomatic as well as physiological state. By investigation of the fingertip images, areas of energy congestion can be recognized and overall health in the entire system can be detected. These fingertip images change with emotional and health conditions. Each captured fingertip image is analyzed by division into a number of sectors following acupuncture meridian theory. The parameters related to the images captured under electrical stimulation create a neurovascular reaction of the skin, which is influenced by the nervous-humoral status of all organs and systems of the body. 51 subjects i.e. 32 males and 19 females in the age group of 18 years and above (mean age  $45.64 \pm 14.43$ ) were recruited in the study. Data was collected by EPI device before

and after 5 days of intensive meditation. Results showed significant availability of high functional energy reserve in meditators. The researchers also observed similar trends without filter (psycho-physiological) indicating high reserves of energy at psycho-physiological level also. Activation coefficient, another parameter of EPI, was reduced. This signified a relaxed state than earlier, possibly due to parasympathetic dominance. The study showed a reversed change in integral entropy in the right side without filter; but, the values on both sides with filter was increased, which indicated disorder. EPI may be a powerful tool to study effects of other relaxation techniques also in future. [13]

In recent times individuals are becoming more dependent on virtual world. Blue Whale Challenge<sup>14</sup> is a phenomenon which gained its early foothold on the internet chat boards. It is a dare-based harmful game which has a list of fifty tasks which needs to be performed, culminating in one's death on the final task. The fatalities caused by individuals playing this game was reported first in Russia first and followed by at least twenty countries. A study was conducted by Mahadevaiah M et al [14] to assess perceptions and knowhow of the first responders in medical profession about online challenges. Fifty-four medical professionals who practice either psychiatry, clinical psychology, or pediatrics were interviewed using a semi-structured open-ended survey and data were obtained. The findings were as follows:

1. Thirty-five (65%) of the total participants were found to have heard about the Blue Whale Challenge but lacked further knowledge about the game.
2. Ten percent of total participants knew about other internet challenges.
3. 26% of total participants were largely aware about the details and harmful nature of the game.
4. 12 (22%) participants knew the signs to identify the children playing this game.

5. None of the practitioners reported of having encountered any parent or child enquiring or reporting this in their practice at the time of conducting the survey.

The study concluded that medical fraternity is lagging behind in updating themselves of the online phenomena which are important for the better outcome of children presenting with participation in online challenges.

In this era when human beings are becoming more and more dependent on the virtual world and facing pandemic of lifestyle disorders and stress, awareness programmes needs to be implemented among health professionals for better management of patients in present hour of crisis.

In modern civilization human beings are becoming more and more mentally isolated. This is adding stress to our daily lives. Stress is not only affecting individuals but sometimes family as a whole. Suicides rank high as the cause of human deaths. Stress plays a major role in triggering suicidal events. [15]

A study by Kuttichira P published in 2018 [15] explored the family suicides committed in Kerala. All the family suicides reported from four central districts of Kerala State during the year 2000 were included in the study. Cases were prospectively located from different sources. Information was gathered in the following way: from survivors, family and key persons in the locality.

84 lives were lost in 32 incidents involving 99 persons. No report was obtained from Muslim dominated districts. Largest age group was aged 19 years and below. Poisoning was the most frequent method used; drowning, burns, hanging and wrist slashing followed respectively. Suicide notes were left in half of the cases.

Mental illness and physical illness were noted in five and eight incidents respectively. Financial crisis reported as the main reason. Half of the families that had committed suicide were leading a life at a higher level than they could have afforded. Warning signals were noted in 12 incidents.

Decision for suicide was taken by father and mother (17 cases), mother (10 cases) or father alone (5 cases).

Firm stand of the religion against suicides did explain absence of family suicides from Muslim dominated district. Opening up of avenues for higher dreaming due to globalization and wider visual media could be a reason for living unaffordable standard of life and resulting in financial crisis. The warning signals were recognized by others outside the families, but none responded or tried to help. Social support was strong within the family but did not exist outside the family. Social awareness of mental health problem is necessity of this present era and needs to be implemented. [15]

The Indian Mental Healthcare Act 2017 received presidential assent on April 7th, 2017 and replaced the 1987 Act. The new act intends to align and harmonize existing laws with the Convention on Rights of Persons with Disabilities and its optional protocol which India ratified in 2007. The bill is a big leap in principles with the rights of the mentally ill at its core. [16]

From review of articles published in 2018 it will be evident that evidence-based complementary and alternative medicine (CAM) practices are effective in treatment of various physical and psychological problems and needs to be combined with conventional therapies as an integrative approach in patient care. [17]

To cope with cancer and its treatment-related side effects and toxicities, people are increasingly using complementary and alternative medicine (CAM). Integrative oncology, combines conventional therapies and evidence-based CAM practices, is an emerging discipline in cancer care. An electronic database search (PubMed), revealed 138 relevant clinical trials on the use of yoga in cancer patients. A total of 10,660 cancer patients from 20 countries were recruited in these studies. Most of the studies reported that yoga improved the physical and psychological symptoms, quality of life, and markers of immunity of the patients, providing a strong

support for yoga's integration into conventional cancer care. [17]

A study by Sharma K et al [18] was conducted to investigate the effect of regular meditation practice on EEG brain dynamics in low-frequency bands of long-term Rajyoga meditators. Lower frequency EEG bands were analyzed during rest and during meditation. Twenty-one male long-term meditators (LTMs) and same number of age matched controls were selected to participate in study. Semi high-density EEG was recorded before and during meditation in LTM group and during rest in control group.

The main outcome of the study was spectral power of alpha and theta bands and cortical (hemispherical) asymmetry was calculated using band power. Results revealed:

1. High-band power in alpha and theta spectra in meditators.
2. Cortical asymmetry was calculated through EEG power was also found to be high in frontal as well as parietal channels.
3. No correlation was seen between the experience of meditation (years, hours) practice and EEG indices.

This study suggested a positive impact of meditation on frontal and parietal areas of brain, involved in the processes of regulation of selective and sustained attention as well as provide evidence about their involvement in emotion and cognitive processing. [18]

The aim of a study by Praveena SM et al [19] was to observe the effect of 3-month long Yoga practice on HRV in early postmenopausal women. 67 women within 5 years of menopause in the age group of 45 and 60 years were enrolled. HRV of 37 cases (Yoga group) and 30 controls (non-Yoga group) was recorded pre and 3-month post intervention.

In HRV The following changes were observed:

- A. Frequency domain analysis showed a significant fall in low frequency (LF) in normalized units (nu)
- B. Fall in LF: high frequency (HF) ratio

C. Significant rise in HF in nu in the Yoga group (depicting parasympathetic dominance) against a significant rise in LF (nu) and LF: HF ratio

D. Significant fall in HF (nu) in non-Yoga group (indicating sympathetic dominance).

E. Time domain analysis showed a significant decrease in Standard Deviation of NN intervals in Non-Yoga group against nonsignificant changes in Yoga group indicating deterioration in parasympathetic activity in non-Yoga group.

The study suggested that three-month long Yoga practice improved HRV in early postmenopausal women significantly and has the potential to attenuate the CVD risk in postmenopausal women. Our study also demonstrated similar results in women of reproductive age group following PMR training. We did not assess the effects on HRV. We had only recorded pulse, blood pressure in the present study.

The purpose of a study conducted by Naik GS et al [20] was to assess the effect of a modified form of isolated alternate nostril, slow breathing exercise on perceived stress, and cardiovascular parameters in young, male healthy volunteers.

Hundred healthy male volunteers were randomized into two groups: control group,  $n = 50$  and slow breathing group (study),  $n = 50$ . Study group practiced slow breathing exercises for 30 min a day, 5 times/week for 12 weeks, under the supervision of certified yoga trainers. In our study we only provided supervised training to our subjects once weekly, they had to practice PMR on their own on other days. Parameters studied were:

1. Perceived Stress Scale (PSS) using Cohen's questionnaire,
2. Anthropometric parameters such as body mass index (BMI), waist-hip ratio (WHR),
3. Cardiovascular parameters such as heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP)

All parameters were recorded at baseline and after 12 weeks. In the present study we analyzed our subjects only once.



The control group did not receive any intervention. Study group practiced slow breathing exercise training. HR, SBP, DBP, and PSS decreased significantly ( $P < 0.05$ ) in the study group following 12 weeks slow breathing exercise training, while no significant change ( $P > 0.05$ ) was observed in BMI and WHR. Twelve weeks of modified slow breathing exercise reduced perceived stress and improved the cardiovascular parameters.

The investigation by Joshi SS et al [21] was undertaken to examine the effects of mindfulness-based cognitive therapy (MBCT) on the following factors:

1. interepisodic symptoms,
2. emotional regulation,
3. quality of life in patients with bipolar affective disorder (BPAD) in remission.

Five patients with the diagnosis of BPAD in partial or complete remission were included. Each patient was assessed on the below scales:

- A. Beck Depressive Inventory I
- B. Beck Anxiety Inventory
- C. Difficulties in Emotion Regulation Scale
- D. Acceptance and Action Questionnaire-II
- E. The World Health Organization Quality of Life Assessment-BREF.

Following pre assessments, patients underwent 8–10 weeks of MBCT. Improvement was seen in all five cases on the outcome variables. This study demonstrated that stress management programmes need to be included in treatment of psychiatric disorders along with conventional therapies for better management of patients.

We conducted pilot projects to study the effects of stress on Medical students and effect of PMR. Progressive muscle relaxation helps in modulation of heart rate, blood pressure, and lipid profile in healthy normal adult individuals. Increased stress levels do increase body mass index and waist/hip ratio, dyslipidemia. This perhaps leads to autonomic dysfunctions and increase in incidence of cardiovascular disease. Lifestyle modification with relaxation exercises does affect stress levels

to decrease and improves autonomic functions, cardiopulmonary efficiency, and lipid profile. [22-24]

Medical education is inherently stressful and emotionally demanding training. There is a negative impact of stress on health and education among MBBS students. Subjects with blood group perceive more stress as compared to subjects of blood group A and perceived stress causes dyslipidemia. PMR and walking were equally effective in reducing stress and improving cardiovascular profile in young adults and may be used as a cost-effective way to improve health and quality of life.

We also conducted five studies to demonstrate effects of PMR on cardiovascular profile in postmenopausal females, PCOS patients, female health care professionals and young adult males and observed positive influence of PMR on cardiovascular profile and to study correlation of body fat and blood lipids with autonomic nervous system activity in postmenopausal Indian women. [25-28] We conducted another study to observe effects of PMR on pain management in OA patients [29] and PSS were significantly decreased in subjects practicing PMR and outcome of treatment in this group was significantly better as compared to the other group. The application of stress relaxation exercises as an adjuvant in the treatment of OA process holds promise for the development of new, potentially disease modifying non-pharmacologic therapies.

PCOS patients are a high risk group for developing metabolic syndrome and relaxation therapies may be recommended as an adjuvant therapy to tilt the autonomic balance to parasympathetic dominance to improve cardiovascular profile. Increasing stress among female health care professionals is a cause for concern and there is need to adopt early lifestyle modification by practicing relaxation exercises to ameliorate stress and to improve not only their quality of life in general but patient care in particular.

From the above discussions it is evident that stress is a great challenge of the present civilization, both for diseased as well as healthy individuals, and the time has come recognize the importance of stress management strategies and making them a part and parcel of daily life.

## CONCLUSIONS

Progressive muscle relaxation is easy to learn and Practice. Raj yoga meditation as well as PMR are equally effective in reducing perceived stress in females of reproductive age group and thereby may decrease stress related hazards.

**Limitations:** This was a cross sectional study which itself adds to its limitations.

**Conflict of interest:** Declared None.

## REFERENCES

1. Varvogli L, Darviri C. Stress Management Techniques: evidence-based procedures that reduce stress and promote health. *Health Science Journal* 2011; 5 (2): 74-89.
2. Kar SK, Yadav S, Agarwal V. Impact of culture on gender roles: A mental health perspective. *Indian J Soc Psychiatry* 2016;32:337-8.
3. "Crimes Against Women" (PDF). Ncrb.gov.in. National Crime Records Bureau. 2013. Retrieved 2014-03-02.
4. Avon Global Center for Women and Justice at Cornell Law School; Committee on International Human Rights of the New York City bar Association, Cornell Law School International Human Rights Clinic; the Virtue Foundation (2011). "Combating Acid Violence in Bangladesh, India, and Cambodia". Avon Foundation for Women. pp. 1–64. Retrieved 20 March 2014
5. Goyal M; Indian women most stressed in the world: Nielsen survey. 2011. Available from [http://articles.economictimes.indiatimes.com/2011-06-29/news/29717262\\_1\\_indian-womenstress-workplaces](http://articles.economictimes.indiatimes.com/2011-06-29/news/29717262_1_indian-womenstress-workplaces)
6. Bharshankar JR, Bharshankar RN, Deshpande VN, Kaore SB, Gosavi GB. Effect of yoga on cardiovascular system in subjects above 40 years. *Indian J PhysiolPharmacol.* 2003;47 (2):202–6.
7. Desikachar K, Bragdon L, Bossart C. The yoga of healing: Exploring yoga's holistic model for health and well-being. *Int J Yoga Ther.* 2005;15:17–39.
8. Hashim HA, Yusof HHA. The Effects of Progressive Muscle Relaxation and Autogenic Relaxation on Young Soccer Players' Mood States. *Asian J Sports Med.* 2011; 2(2): 99–105.
9. Mannapur B, Dorle AS, Hiremath LD, Ghattargi CH, Ramadurg U, Kulkarni KR. A study of psychological stress in undergraduate medical students at S. N. Medical College, Bagalkot, Karnataka. *J ClinDiagn Res* 2010;4: 2869-74.
10. Kane P P. Stress causing psychosomatic illness among nurses. *Indian J Occup Environ Med.* 2009; 13(1): 28–32.
11. Rode MV, Kamble P, Phatak MS, Jadhao P, Tayde P. Effect of premenstrual stress on autonomic function. *Annals of Neurosciences* 2010; 17: 131-3.
12. Ghar M, Chaudhuri A, Rahaman WB, Majumdar S, Biswas A, Goswami A. A study of the effect of Raj yoga on cardiorespiratory parameters in young adult Indians. *Saudi J Sports Med* 2016; 16: 111-7.
13. Deo G, Itagi R K, Thaiyar M S, Kuldeep KK. Effect of anapanasati meditation technique through electrophotonic imaging parameters: A pilot study. *Int J Yoga* 2015; 8: 117-21.
14. Mahadevaiah M, Nayak RB. Blue whale challenge: Perceptions of first responders in medical profession. *Indian J Psychol Med* 2018; 40: 178-82.
15. Kuttichira P. The phenomenon of family suicides: An explorative study into consecutive 32 Incidents in Kerala. *Indian J Psychol Med* 2018; 40: 108-12.
16. Kumar MT. Mental healthcare Act 2017: Liberal in principles, let down in provisions. *Indian J Psychol Med* 2018; 40: 101-7.
17. Agarwal RM, Maroko-Afek A. Yoga into cancer care: A review of evidence based research. *International journal of yoga.* 2018; 11(1):3-29.
18. Sharma K, Chandra S, Dubey AK. Exploration of lower frequency EEG dynamics and cortical alpha asymmetry in long-term rajyoga meditators. *Int J Yoga* 2018; 11: 30-6.
19. Praveena SM, Asha G, Sunita M, Anju J, Ratna B. Yoga offers cardiovascular

- protection in early postmenopausal women. *Int J Yoga* 2018;11: 37-43.
20. Naik G S, Gaur G S, Pal G K. Effect of modified slow breathing exercise on perceived stress and basal cardiovascular parameters. *Int J Yoga* 2018; 11: 53-8.
  21. Joshi SS, Sharma MP, Varambally S. Effectiveness of mindfulness-based cognitive therapy in patients with bipolar affective disorder: A case series. *Int J Yoga* 2018; 11: 77-82.
  22. Chaudhuri A, Ray M, Hazra SK, Goswami A, Bera S. Correlation of perceived stress with blood group A and O among medical students and its effect on lipid profile in a medical college of Eastern India. *Saudi J Sports Med* 2016; 16: 57-61.
  23. Chaudhuri A, Goswami A, Ray M, Hazra SK. To study impact of stress on education and health profile of newly admitted medical students in a medical college of Eastern India. *Saudi J Sports Med* 2016; 16: 41-6.
  24. Chaudhuri A, Goswami A, Ray M, Hazra SK, Bera S. Comparative study of effect of progressive muscle relaxation and walking on stress and cardiovascular profile in young adults of health sector. *Saudi J Sports Med* 2016; 16:47-52.
  25. Chaudhuri A, Ray M, Saldanha D, Bandopadhyay AK. Cardio-respiratory response of young adult Indian male subjects to stress: Effects of progressive muscle relaxation. *Medical Journal of Dr. D. Y. Patil University*.2014 ;7(3):1-6.
  26. Chaudhuri A, Ray M, Dasgupta S, Ghosh MK, Biswas A, Hazra SK. Effect of progressive muscle relaxation on the adverse cardiovascular profile in women with polycystic ovarian syndrome. *J Basic Clin Reprod Sci* 2014; 3: 115-20.
  27. Chaudhuri A, Ray M, Saldanha D, Sarkar SK. Effects of progressive muscle relaxation on postmenopausal stress. *J Sci Soc* 2015; 42: 62-7.
  28. Chaudhuri A, Ray M, Saldanha D, Bandopadhyay AK. Effect of progressive muscle relaxation in female health care professionals. *Ann Med Health Sci Res* 2014; 4: 791-5.
  29. Chaudhuri A, Ray M, Hazra SK. To study effectiveness of progressive relaxation on balancing exercises in functional outcome of osteoarthritis knee in postmenopausal females. *Saudi J Sports Med* 2016; 16: 62-7.

How to cite this article: Chaudhuri A, Ghar M. A study to compare the effect of Raj yoga and Progressive Muscle Relaxation on cardio respiratory parameters in Indian Females of reproductive age group. *International Journal of Research and Review*. 2019; 6(5):353-363.

\*\*\*\*\*