



ORIGINAL RESEARCH PAPER

MODULATION OF LIPID PROFILES AND PULMONARY FUNCTIONS IN HYPER-REACTOR YOUNG HEALTHY MEDICAL STUDENTS TO COLD PRESSOR TEST, AFTER SIX MONTH OF YOGA PRACTICES.

Biochemistry

KEY WORDS: yoga, cold pressor test, lipid profiles, pulmonary functions

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ABSTRACT

Stress is described as a state of anxiety, strain, nervousness, tension, constant worry or pressure, to produce hyper-reactivity to stress, hypertension and other cardiopulmonary disorders and greatly enhanced secretion of cortisol due to increased activity in the limbic system, especially in the region of the amygdala and hippocampus. The aims of this study was to investigate whether regular practice of yoga for six month can improve the lipid profiles and pulmonary function in hyper-reactors to cold pressor test in young healthy medical students.

INTRODUCTION

Worldwide, medical colleges are responsible for making sure that medical students have adequate knowledge and skill before taking professional responsibilities.^[1] In order to achieve these goals, medical colleges typically use a curriculum of lectures, simulations supervised practice, mentoring, and hands-on experience to boost individual skill-set. Unfortunately, some aspects of the training process have unintended negative consequences on student's physical and emotional health.^[2,3] Studies revealed that medical students experience a relatively high level of personal distress, with adverse consequences on academic performance, competency, professionalism and health.^[2,3,4,5]

Academic examination stresses were reported to have a significant impact on the students well-being and are associated with changes in the mental and physical health such as increasing anxiety, increasing negative mood and changes in the immune functioning.^[6]

The increase stress hormones may be as a result of stimulation of the ACTH secretion which stimulated the synthesis of adrenaline and cortisol precursor and paraventricular nuclei of the hypothalamus secrete corticotrophin releasing hormone (CRH) into the hypophyseal portal system.^[7,8,9]

In the study, cold pressor test, introduced by Hines and Brown, was employed to measure the cardiovascular reactivity. The persons hyper-reactive to cold pressor test are susceptible for early onset of hypertension, other cardiovascular-pulmonary disorders and lipid profiles in future.^[10] research focuses on use of yoga as stress management techniques improving the pulmonary and lipid status in the medical students.

We tested whether regular practice of Yoga for 6 months can reduce the lipid profiles level, and cardiovascular hyper reactivity, reducing the cardio vascular pulmonary disorders, by inducing parasympathetic predominance and cortico-hypothalamo-medullary inhibition.^[11] The present study has been undertaken with the aim of de-stressing the hyper-reactors by practicing Yoga, because hyper-reactors are likely to develop hypertension and other stress related pulmonary diseases in future life.

AIMS & OBJECTIVE:

The aim of present research was to study the effect of six month yoga practice over lipid profiles and pulmonary function tests on hyper-reactor young healthy medical students.

MATERIALS & METHOD:

Study Design: Interventional Cross Sectional Study.

Place Of Research: Department of Physiology, S.S.M.C. & H Jabalpur (M.P.)

Study Period: March to August 2024. Six months

Study Subjects: Forty hyper-reactors young healthy male medical students, age group 18 to 25.

Inclusion Criteria: All Forty hyper-reactors subjects of age group 18 to 25 who were healthy, non-smoker, no history of hypertension and stress related diseases and not doing any type of physical exercise.

Exclusion Criteria. Subjects who were taking other physical activity like gym, athletics etc. smokers, alcoholic, with respiratory disorders, jaundice, diabetes, hypertension and stress related diseases.

METHODOLOGY: The present study was conducted on forty hyper-reactor young healthy medical students studying in S.S. medical college, underwent thorough clinical examination with proper history was taken with special emphasis on history related to hypertension and stress related diseases and not doing any type of physical exercise.

Afterwards record the basal Sys.B.P., dias.B.P. They were subjected to cold pressor test according to Hines & Brown.^[10] Rise of systolic BP more than 20 mm Hg and dias.B.P. 15 or more mm Hg was considered as hyper-reactive response.^[10] Out of 50 volunteers, 40 became hyper-reactor. Out of 40 hyper-reactor, 32 (80%) turned out to be hypo-reactors due to effec of yoga practices.

These 40 hyper-reactor underwent pulmonary function tests and lipid profile assessment were evaluated. The pulmonary function test comprised of study of FEV₁, FVC and MVV and lipid profile assessment was measuring Total cholesterol, Low Density lipoprotein and High Density lipoprotein at first before start of study and then after six months of Yoga (including yogic exercises, Bhastrika and Anulom- vilom Pranayama and Meditation)

After explaining and training the students, Spirometry of all hyper-reactors was done by Computerized Spiro meter "Spiro excel PC based Pulmonary function test"^[26] in a well- ventilated room, after written consent. Parameters recorded by Computerized Spiro meter were FEV₁, FVC and MVV.

Forced Expiratory Volume in First Second (FEV₁):

The students were asked to take a deep breath in, as long as possible, and blows out as fast as possible and keeps going until there is no air left.

ForcedVital Capacity:

Students were asked to sit erect and take a deep breath, to inhale maximally, then hold the breath and to insert mouth piece of instrument into the oral cavity and close the lips tightly so that there is no gap between the lip and mouth piece thus preventing leakage of air. Both nostrils were then closed by using nose clips then subject is asked to make forceful and prolonged expiration into the mouth piece and continue to exhale until he or she can exhale no more.

Maximum Voluntary Ventilation:

Student was instructed to take normal breath by mouth piece with closed nostril with gradually increasing the rate and speed of respiration.

Total cholesterol was carried out by enzymatic method and using the separated serum from the subjects. The enzymatic assessment was done by using biochemical assay kits prescribed for the Analyzer BA 88 of Nicholas Company.

All the 40 hyper-reactors of study group were trained under the guidance of a certified "yoga" teacher for 15 days in the Department of Physiology. They carried out "Bhastrika and Anulom- vilom Pranayama and Meditation" 30 minutes, daily for six months, under supervision, in a prescribed manner.

Again cold pressor test was done in all hyper-reactors and compared the all parameters, including Sys. B.P., Dias. BP, FEV₁, FVC and MVV, Total cholesterol, Low Density lipoprotein and High Density lipoprotein values before and after yoga, were found to be statistically significantly reduced by using student "t" test

RESULTS

Our results showed that Yoga practices significantly reduced the cardiovascular hyper-reactivity in 40 male volunteers. The 32 were hypo-reactor to cold pressor test due to practiced yoga regularly for six months and carried out statistical analysis using student paired t test and observed that the Sys. B.P., Dias. BP, FEV₁, FVC and MVV, Total cholesterol, Low Density lipoprotein and High Density lipoprotein values were statistically highly significantly decreased. (Table-1, and 2).

Table No. 1: Showing Basal Values And Effects Of Yoga On Sys. B. P., Dias. B. P With Their Mean & Standard Deviation And P Value In Study Group.

| Parameters | Effect of cold pressor test | | P value |
|----------------------------------|-----------------------------|-------------------------|-----------|
| | before yoga | After six month of yoga | |
| Systolic Blood Pressure(mm Hg) | 140.2 ± 5.80 | 120.0 ± 1.98 | (p<0.000) |
| Diastolic Blood Pressure(mm Hg) | 97.77 ± 3.39 | 76.22 ± 4.13 | (p<0.000) |

Table No. 2: Showing Changes In Basal Mean FEV₁, Mean FVC And Mean MVV And Basal Lipid Profiles Before And After Six Months Of Yoga In hyper-reactor Medical Students.

| S. N. | Pulmonary Parameters | Before Start of Study (Mean value with S.D.) | After six months of yoga (Mean with SD) | P value |
|-------|---------------------------|--|---|---------|
| 1. | Mean FEV ₁ (L) | 1.322 ± 0.30 | 1.520 ± 0.21 | p<0.000 |
| 2. | Mean FVC (L) | 4.10 ± 0.06 | 4.60 ± 0.04 | p<0.000 |
| 3. | Mean MVV (L/min) | 120.0 ± 19.9 | 122.2 ± 0.49 | p<0.000 |
| 4. | Mean Total Cholesterol | 224.8 ± 5.00 | 190.2 ± 4.4 | p<0.000 |
| 5. | Mean LDL (mg/dL) | 108.0 ± 7.41 | 87.03 ± 6.4 | p<0.000 |
| 6. | Mean HDL (mg/dL) | 56.13 ± 4.04 | 68.34 ± 4.05 | p<0.000 |

DISCUSSION

On analyzing the effect of yoga on 40 hyper reactors, age group 18-25 years, in our study. The basal sys. B. P, dias. B.P, basal mean FEV₁, mean FVC, mean MVV and basal Mean total cholesterol, mean LDH and mean HDL values were studied before yoga and after six month of yoga. Statistically highly significant (p<0.000) changed all parameters & 32 subjects became hypo-reactors due to decrease sympathetic activity & increase parasympathetic activity of A.N.S. due to increase in vegal tone^[12,13,14,15] In the present study we observed that due to regular practices of Pranayama and meditation the mean forced expiratory volume in first second, mean forced vital capacity and mean maximum voluntary ventilation were improved due to increased chest wall expansion resulted from the increased respiratory muscle strength because of Pranayama effect were statistically highly significant^[16,17,18] and removes his attention from worldly worries and "de-stress" him. This may decrease release adrenaline i.e. decrease sympathetic activity and hence decrease in heart rate, respiratory rate, blood pressure etc.^[19] and also increase muscular efficiency and reduce perceived exertion and has profound effect on the autonomic nervous system, improves lung function, decreases respiratory rate, increases vital capacity and breath holding time.^[20,21,22]

To meet the modern lifestyle full of challenges, stress and tensions an all-round personality development has become mandatory for the student. Thus, yoga can be beneficial in achieving a tranquil state of mind during routine activities and yet providing then concentration and arousal essential in demanding or stressful situations.^[23]

CONCLUSION

It was concluded that regular practice of yoga control release of stress hormones, beneficial in stress related disorders, improving autonomic functions, lower blood pressure, increase strength & flexibility of muscles, bring the lipid profiles normal, improve the sense of well being, slowed ageing process, and improving physically, mentally, spiritually and financially spiritual growth. Thus society becomes more disciplined.

Summary -

The regular practice of yoga for six months acts as stress buster, to reduce the hyperactivity to cold pressor test by inducing parasympathetic predominance and cortico-hypothalamo-medullary inhibition.

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