



ORIGINAL RESEARCH PAPER

Physiology

“CORTISOL AND CARDIOVASCULAR PARAMETERS MODULATION IN REGULAR PRACTICE OF YOGA IN HYPER-REACTORS YOUNG HEALTHY MEDICAL STUDENTS TO COLD PRESSOR TEST.”

KEY WORDS: yoga, cold pressor test, cortisol, cardiovascular parameters

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ABSTRACT

Stress is described as a state of anxiety, strain, nervousness, tension, constant worry or pressure, to produce hypertension and other cardiovascular disorders and can 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 sixty minutes twice a day for six months can improve the cardiovascular status and decrease serum cortisol in hyper-reactors to cold pressor test in young healthy medical students. **Summary-** The regular practice of yoga for six months acts as stress buster, to reduce the hyperreactivity to cold pressor test by inducing parasympathetic predominance and cortico- hypothalamo-medullary inhibition.

INTRODUCTION

Stress is a complex, dynamic process of interaction between a person and his or her life.^[1] Stress can affect one's health, work performance, social. The stress response is a complex emotion that produces physiological changes to prepare us for fight-or-flight, to defend ourselves from the threat or flee from it.^[2] Stress can also be defined as the harmful physical and emotional responses that occur when the requirements of the work do not match the capabilities. Stress is a silent killer and prolonged exposure to stress may exert harmful effects on physical, psychological and behavioral well-being of an individual.^[3] Stress-related disorders evolve gradually through four recognizable stages- first psychological changes, second symptomatic changes, third biochemical imbalances and finally irreversible symptoms that often require surgical or long-term management applications.^[4]

The stress hormone, cortisol, is public health enemy and elevated cortisol levels act as a potential trigger for mental illness and decreased resilience especially in adolescence.^[5] affect multiple systems of body. Physical and psychological stresses can induce a wide range of immunological alterations in the cell mediated and humoral immunity.^[6,7] In humans, a range of stressful events have been associated with lowering the immune system functioning, including examinations, battle task, vigilance, sleep deprivation.^[8]

Almost any type of physical or mental stress can lead within minutes to greatly enhanced secretion of cortisol due to increased activity in the limbic system, especially the amygdala and hippocampus, both transmit signals to the posterior medial hypothalamus. Cortisol has direct negative feedback effects on.^[9] The increase stress hormones may be as a result of stimulation of the ACTH secretion by the stress stimuli which stimulated the synthesis of adrenaline and cortisol precursors.^[10] In response to a stressor, neurons of paraventricular nuclei of the hypothalamus secrete corticotrophin releasing hormone (CRH) into the hypophyseal portal system.^[11,12]

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, and other cardio vascular disorders in future.^[13]

Yoga practices are time-honored stress management/health promotion techniques whose health benefits are being validated by modern medical science, significantly reduced levels of cortisol, reduce the level of stress, relieve anxiety,

depression, increase anti-oxidant production, enhance brain function, enhance health well-being and peace of mind.^[14]

Yoga is the best lifestyle modification, which aims to attain the unity of mind, body and spirit through asanas (exercise), pranayama (breathing), and meditation.^[15]

We tested whether regular practice of Yoga for 6 months can reduce the serum cortisol level, and cardiovascular hyper reactivity, reducing the cardio vascular disorders, by inducing parasympathetic predominance and cortico-hypothalamo-medullary inhibition.^[16] 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 diseases in future life.

AIMS & OBJECTIVE:

The aim of present research was to study the effect of six month yoga practice over serum cortisol and Systolic, diastolic blood pressure and pulse rate/ min on young healthy medical students.

MATERIALS & METHOD:

Study Design: Interventional Cross Sectional Study.

Place of Research: Department of Physiology, Index medical college Indore (M.P)

Study Period: January to June 2020. Six months

Study Subjects:

One hundred Fifty young healthy medical students, age group 18 to 27.

Inclusion Criteria:

All One hundred fifty subjects of age group 18 to 27 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 one hundred fifty young healthy medical students studying in Index 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., pulse pressure and estimate serum cortisol by ELISA. They were subjected to cold pressor test according to Hines & Brown.^[13] 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 150 volunteers, 105 (70%) turned out to be hyper-reactors. These hyper-reactors carried out Yoga for 60 minutes, twice a day for six months, under supervision and guidance of a certified "yoga" teacher. Again cold pressor test was done in all hyper-reactors and compared the all parameters, including Sys. B.P., Dias. BP, Pulse rate/min and level of serum cortisol before and after yoga, and cold pressor test value before and after yoga, were found to be statistically significantly reduced by using student "t test.

RESULTS

Our results showed thaYoga practices significantly reduced the cardiovascular hyper-reactivity . In 150 male volunteers, the 105 were hyper-reactor to cold pressor test and these hyper-reactors practiced yoga regularly for six months and after this, all became hypo-reactors by carried out statistical analysis using student paired t test and observed that the serum cortisol, basal B.P., rise in BP and pulse rate due to cold stress, were statistically highly significantly decreased. (Table-1, 2 and 3).

Table No. 1: Showing basal values and effects of yoga on Sys. B. P., Dias. B. P., Pulse rate/ min, Serum Cortisol level with their Mean & Standard Deviation and p value in study group.

Parameters	Basal value	Effect of six month of yoga	P value
Systolic Blood Pressure(mm Hg)	124.1 ± 2.82	120.0 ± 1.98	(p<0.000)
Diastolic Blood Pressure(mm Hg)	82.68 ± 3.13	78.25 ± 4.15	(p<0.000)
Pulse rate/ min	77.79 ± 5.14	75.28 ±4.89	(p<0.000)
Serum Cortisol in microgram /dl	10.05 ± 0.612	8.18 ± 0.726	(p<0.000)

Table No. 2: Showing effect of cold pressor test before and effects of yoga, on Sys. B.P., Dias. B. P, Pulse rate/ min and Serum Cortisol level with their Mean , Standard Deviation and p value in study group

Parameters	Effect of cold pressor test		P value
	Effect of cold pressor test before yoga	Effect of six month of yoga	
Systolic Blood Pressure(mm Hg)	1422 ± 5.87	120.0 ± 1.98	(p<0.000)
Diastolic Blood Pressure(mm Hg)	98.77 ± 3.39	78.25 ± 4.15	(p<0.000)
Pulse rate/ min	85.77 ± 5.32	75.28 ±4.89	(p<0.000)
Serum Cortisol in microgram /dl	12.62 ± 0.579	8.18 ± 0.726	(p<0.000)

Table No 3: Showing effects of cold pressor test, before & after Yoga practices of six months on Sys. B. P.Dias. B. P., Pulse rate/ min and Serum Cortisol level with their Mean , Standard Deviation and P value in study group.

Parameters	Effect of cold pressor test		P Value
	before Yoga Practices (C.P.T. 1st)	After Yoga Practices of six month (C.P.T.2nd)	

Systolic Blood Pressure (mmHg)	1422 ± 5.87	133.93 ± 3.93	(p<0.000)
Diastolic Blood Pressure (mmHg)	98.77 ± 3.39	92.06 ± 3.65	(p<0.000)
Pulse rate/ min	85.77 ± 5.32	78.59 ± 4.68	(p<0.000)
Serum Cortisol in microgram /dl	12.62 ± 0.579	9.22 ± 0.728	(p<0.000)

DISCUSSION

On analyzing the effect of yoga on hyper reactors 105 medical students, age group 18-27 years, in our study. The basal sys. B. P, dias. B.P., pulse rate and serum cortisol values were studied before yoga and after six month of yoga and also studied the effect of cold pressor test before and after yoga.. Statistically highly significant (p<0.000) decreased all parameters & all became hypo-reactors due to decrease sympathetic activity & increase parasympathetic activity of A.N.S. due to increase in vagal tone^[17,18,19,20,21]. were statistically highly significant. DBP depends upon peripheral resistance and lung inflation has been known to decrease systemic vascular resistance and decrease in DBP.^[22]

This inhibition optimizes the body's sympathetic responses to stressful stimuli and restores autonomic regulatory reflex mechanisms results in lower anxiety, heart rate, respiratory rate, blood pressure, and cardiac output in students practicing yoga and meditation.^[23]

CONCLUSION

It was concluded that Yoga is a great gift provided by great ancient Indian sages. Regular practice of Yoga has been reported to control stress, beneficial in stress related disorders, improving autonomic functions, lower blood pressure, increase strength & flexibility of muscles, improve the sense of wellbeing, slowed ageing process, reducing signs of oxidative stress and improving spiritual growth. Thus physically, mentally, spiritually and financially. society becomes more disciplined.

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