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## Effect of yogic intervention on stress levels among IT professionals: A quasi experimental study

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### Abstract

**Background:** The dynamic, targeted, and time-bound working nature of the Information Technology (IT) profession will expose high-stress levels with high prevalence among IT professionals in India. Chronic stress can affect cognitive and emotional functions and can contribute to psychological and physical disorders. Yoga is a holistic intervention that regulates stress, modulates neurochemical pathways, and improves body homeostasis.

**Objective:** To evaluate the effect of a structured yogic intervention on stress levels, blood pressure, and pulse rate among the IT professionals.

**Methods:** This quasi-experimental study recruited 20 IT professionals (12 males, 8 females, mean age 27.25±2.07 years) using convenience sampling. Participants engaged in daily 1-hour yoga protocol for 30 days, including Sukshma Vyayama, asanas, pranayama, meditation, relaxation, and mindfulness practices. Outcomes were measured pre- and post-intervention by Perceived Stress Scale (PSS), systolic and diastolic blood pressure, and pulse rate. Paired t-tests were done for statistical analysis at a significance level of  $p < 0.05$ .

**Results:** The yogic intervention significantly reduces the PSS scores ( $p=0.001$ ), diastolic blood pressure ( $p=0.025$ ), and pulse rate ( $p=0.001$ ). No significant changes were seen in systolic blood pressure ( $p=0.2$ ).

**Discussion:** The results indicate that yoga can effectively reduce stress and improve physiological parameters in IT professionals. The outcomes may be due to modulating the autonomic nervous system, hypothalamic-pituitary-adrenal axis, and neurochemical activity, shifting the body from a stress response to a relaxation response.

**Conclusion:** A structured yogic intervention significantly reduces stress, pulse rate, and diastolic blood pressure, demonstrating that yoga will offer a preventive and therapeutic approach by counteracting these stress induced changes. Future studies with larger sample sizes and randomised controlled trials are needed to confirm these findings and explore long-term benefits.

**Keywords:** Yoga, stress, IT professionals, perceived stress scale, diastolic blood pressure, pulse rate

### Introduction

Information Technology (IT) is one of the rapidly growing industries in India and contributed the most significant growth to the Indian economy [1]. The nature of work in the IT field is extremely dynamic and time-bound. To fulfil the target, employees are engaged in different time zones. This is particularly evident among young professionals willing to work extended hours in pursuit of material comforts and career aspirations [2]. Because of their unique environment, achieving the target within the time zone creates more stress among IT Professionals [3]. The maintenance of life is to keep the internal environment constant, which is called homeostasis. Stress is a factor that threatens homeostasis. Stressors are the actual cause of stress, and the body's response is called the stress response [4]. About 40% of Indians are workers, and they are constantly exposed to stress, among this, a 17.7% prevalence of stress is seen in IT professionals [2, 3]. Stress can produce both positive and negative effects, on the positive side, it helps with the survival of cells or species, but its negative impacts are often more prominent due to their association with various diseases. Chronic stress negatively affects the brain and autonomic nervous system, impairing long-term memory. Studies indicate that stress impacts the amygdala and hippocampus, contributing to psychological disorders

such as anxiety, depression, and bipolar disorder, which, in turn, affect cognition and learning. Stress responses involve hormones, neuroendocrine mediators, peptides, and neurotransmitters, and prolonged or severe stress can lead to the development of hypertension, arteriosclerosis, coronary artery disease, peptic ulcer, gastroesophageal reflux disease, inflammatory bowel disease, dyspepsia, and autoimmune disease by deteriorating the immune system. To address this, healthcare providers should recognise stress, and its role in disease and provide personalised treatments, combining pharmacological options like medications and non-pharmacological approaches such as lifestyle changes, exercise, healthy diets, yoga, naturopathy, and stress management programs [5, 6].

In non-pharmacological management, yoga has a crucial role in reducing stress by modulating the neurochemicals in the brain. Yoga is a 3000-year-old tradition rooted in the Sanskrit word “yuj,” which means to join or union. Yoga is a holistic therapy for various diseases and incorporates Physical posture (Asana), Breathing exercises (Pranayama), Relaxation techniques, Meditation (Dhyana), social restraints (Niyama), and self-discipline (Yama). Instructing yoga practices and teachings to reduce, alleviate, or prevent diseases is known as yoga therapy [7, 8].

The post-COVID era has accentuated stressors related to working from home without time restrictions, and high-performance expectations among young adults increase stress levels [10, 9]. Based on this evidence, we hypothesised that a structured yogic intervention could significantly reduce stress levels among IT professionals by modulating neurochemical pathways and improving physiological and psychological well-being. Practising yoga may help restore homeostasis, alleviate stress-related symptoms, and improve cognitive and emotional resilience, thereby enhancing individuals' overall quality of life in high-stress occupational environments.

**Materials and Methods**

**Study Design and Participants**

This study adopted a ‘Pre-Post Intervention Study with a

Single Group (Non-Randomized), which falls under the broader category of Quasi-Experimental Study Design. The study recruited 20 subjects by convenience sampling technique, 12 of them were male and 8 of them were female, with a mean age of 27.25±2.07 years. The participants were healthy and voluntarily agreed to participate and work in the IT industry. The study was carried out from October to December of 2023. The inclusion criteria will be the participants, between the ages of 19 to 45 years, working in the IT sector, both male and female, not involved in any other exercise-related programme, free of significant illnesses, available for the period of the 30-day intervention, and willing to give consent. Having a severe medical illness, not being interested in providing consent, not being able to present to the intervention, or being out of the designated age range are the restrictions.

**Measurements**

Perceived Stress Scale (PSS) scores, systolic blood pressure, diastolic blood pressure, and pulse rate were measured before and after the intervention. PSS is a self-assessment tool that has 10 items and measures the last 30 days of psychological stress. It has 4 positive items that evaluate a person's capacity to manage current stressors (also known as positive stress) and 6 negative items that determine the degree of lack of control and negative reactions (also known as negative stress). The four positive items are reverse-coded so that greater scores indicate higher stress(10). The systolic and diastolic blood pressure and pulse rate are significantly higher than the baseline when the person encounters stress [11].

**Intervention**

The specific yoga protocol is designed for 1 hour and administered continuously for 30 days from 6:00 to 7:00 am. It includes an introduction speech, Sukshma Vyayama (Loosening exercises), Asanas (Physical postures), Pranayama (Breathing exercises), Meditation, Relaxation techniques, and a resolution (Mindfulness speech). A detailed intervention is provided in Table 1.

**Table 1:** Yoga protocol, Rounds and Duration of practice.

S. No	Yoga	Duration			
1.	Introduction to the class	5 minutes			
2.	Loosening exercise Joint movements	5 minutes			
3.	Standing asana	Round 1	Rest	Round 2	Duration
	Tadasana	30 sec	30 Sec	30 Sec	
	Trikonasana	30 sec	30 Sec	30 Sec	
	Vriksasana	30 Sec	30 Sec	30 Sec	
	Ardha Chakrasana	30 sec	30 Sec	30 Sec	
	veerabhadrasana	30 sec	30 Sec	30 Sec	
4.	<b>Seated asana</b>				
	Sukasana	30 sec	30 Sec	30 Sec	6 minutes
	Janusirasana	30 sec	30 Sec	30 Sec	
Paschimotasana	30 sec	30 Sec	30 Sec		
5.	<b>Supine asana</b>				
	Shavasana	30 sec	30 Sec	30 Sec	4 minutes
	Balasana	30 sec	30 Sec	30 Sec	
6.	<b>Pranayamas</b>				
	Normal breathing with awareness	20 rounds			1 minute
	Diaphragmatic breathing: Focus on deep abdominal breaths.	20 rounds/minute			
	Nadi Shodhana (Alternate Nostril Breathing): Balancing breath.	6 rounds/minute			
Bhramari (Bee Breath): Calming and soothing breath.	6 rounds/minutes				
7.	Meditation:	Mindfulness meditation: Focusing on breath and the present moment.			10 min
8.	Quick Relaxation Technique	Awareness of breathing.			10 min

**Statistical analysis:** After collecting data before and after the 30 days of yogic intervention among IT workers, paired t-tests were applied to calculate mean, standard deviation, and p-values for within-group comparisons using the <0.05 level of statistical significance, and independent t-tests were used for between-group analyses. All statistical analyses were done by using the statistical software Statistical Package for the Social Sciences version 26.

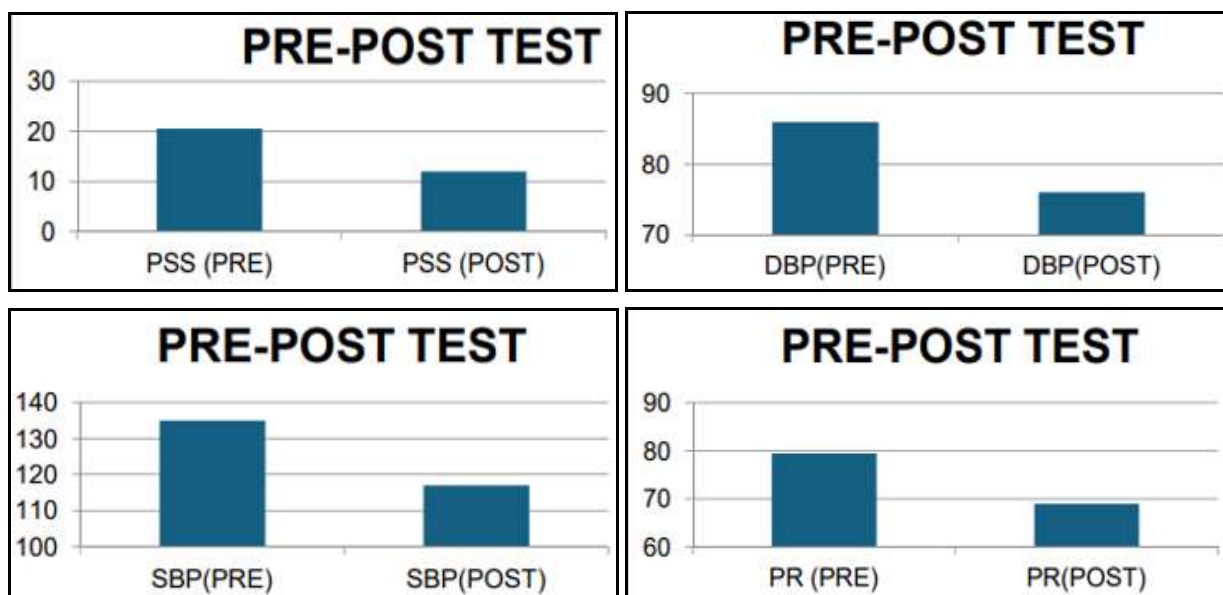
**Results**

The study results demonstrated a significant reduction in the Perceived Stress Scale scores, with p=0.001, which is less

than the threshold for significance p=0.05. The study showed that there is no statistically significant reduction in systolic blood pressure among the subjects, which is indicated by the p = 0.2, as this value exceeded the threshold for significance p = 0.05, and there is a significant reduction in diastolic blood pressure among the subjects, which is indicated by the p = 0.025, which is less than the threshold for significance p = 0.05. Additionally, the study found a significant decrease in pulse rate p=0.001, which is less than a significant of p=0.05. Detailed results are provided in Table 2 and a Graphical representation of the mean value of the paired T-test is given in Figure 1.

**Table 2:** Paired t-test, Comparison of Mean, Standard deviation and P Values of pre-post assessment of Perceived stress scale, Systolic Blood pressure, Diastolic Blood Pressure, and Pulse rate.

Variables	Pre-assessments		Post-assessments		P Value
	Mean	Standard Deviation	Mean	Standard Deviation	
Perceived stress scale (PSS)	20.5	6.363961	12	2.828427	0.001
Systolic Blood pressure(mmHg)	135	4.242641	117	1.414214	0.2
Diastolic Blood Pressure(mmHg)	86	5.656854	76	2.828427	0.025
Pulse rate (Beat/min)	79.5	9.19238815	69	4.2426406	0.001



**Fig 1:** Graphical representation of Mean, and P Values of pre-post assessment of Perceived stress scale (PSS), Systolic Blood pressure (SBP), Diastolic Blood Pressure (DBP), and Pulse rate (PR).

**Discussion**

This study assesses the impact of a specific yogic intervention on stress levels among IT professionals, a working group known to experience high levels of stress due to their dynamic work environment and target-driven nature. The results indicated that the scores for the Perceived Stress Scale were decreased and pulse rate was lowered with a significant decrease in diastolic blood pressure. Hence, yoga is seen as an effective tool for managing stress.

The relationship between stress and disease is complex and differs from person to person. The prevalence of stress-related disorders is increasing nowadays and may increase in the future, particularly in the workplace. In the 21<sup>st</sup> century, work-related deaths are termed Worked to death, drop death, and work until you drop [12]. Stress triggers a complex response involving two pathways - the sympathetic adrenal medullary (SAM) system and the hypothalamic pituitary adrenal (HPA) axis. The interaction between the SAM and HPA systems manages the short-term stress response. However chronic activation of SAM and HPA can lead to

unwanted effects like prolonged cortisol release, suppressing wound healing, impairing the immune function, and disrupting the metabolic processes. Over the period of time, this can contribute to the development of stress-related diseases such as hypertension, diabetes, cardiovascular diseases, and autoimmune disorders [14]. Evidence also suggests that chronic stress causes HPA dysfunction and abnormal regulation of serotonin and dopamine, which plays a significant role in the development of severe and impairing psychiatric conditions, including major depressive disorder, bipolar disorder, posttraumatic stress disorder, anxiety and Depression [14].

Previous studies on yoga have indicated a significant reduction of stress in humans through various mechanisms. Regular practice of yoga modulates the autonomic nervous system (ANS), HPA axis, and neurotransmitter activity leading to decreased levels of cortisol, increased dopamine, serotonin, and melatonin, reduces the pro-inflammatory cytokines like IL-6 and TNF- $\alpha$ , elevates brain-derived neurotrophic factor (BDNF), and gene expression, including

SIRT1 activation. This shifts sympathetic dominance (Fight-or-flight) to parasympathetic activation (Relaxation response), thereby yoga diminishes stress responses, combats depressive symptoms, improves emotional resilience, minimises inflammation, and counteracts stress-related neural changes<sup>[15]</sup>.

### Conclusion

This study highlights the efficacy of a particular yogic protocol for 30 days in decreasing stress levels among IT professionals, and findings have shown prominent reductions in stress, pulse rate, and diastolic blood pressure, signifying that yoga is a method to manage stress. Regular yoga practice modulates the autonomic nervous system, HPA axis, and neurochemical activity and results in decreased stress responses and increased emotional resilience and physiological well-being. These results further suggest that structured yoga could prevent stress, enhance the quality of life, and prevent stress-related health complications. The outcome of this research calls for further studies in higher numbers and randomised controlled trials to validate and determine the long-term effects of this practice.

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