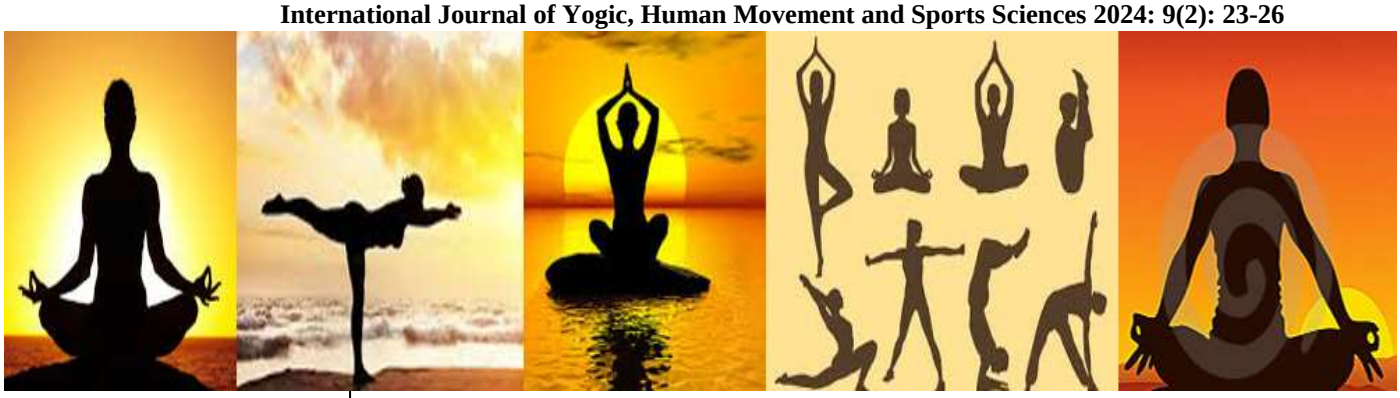
International Journal of Yogic, Human Movement and Sports Sciences 2024: 9(2): 23-26



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2024; 9(2): 23-26

www.theyogicjournal.com
Received: 26-05-2024
Accepted: 29-06-2024

Priya Sharma
Research Scholar, Department of Yogic Sciences, Lakshmi Bai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Dr. Nibu R Krishna
Associate Professor, Department of Yogic Sciences, Lakshmi Bai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Dr. Indu Sharma
Assistant Professor, Yoga Education, Morarji Desai National Institute of Yoga, New Delhi, India

Corresponding Author:
Priya Sharma
Research Scholar, Department of Yogic Sciences, Lakshmi Bai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Effect of yogic practices on selected physiological variables in examination stress among school going students

Priya Sharma, Dr. Nibu R Krishna and Dr. Indu Sharma

DOI: https://doi.org/10.22271/yogic.2024.v9.i2a.1610

Abstract
Background: Stress is frequently linked to a higher incidence of immune system, cardiovascular, and autonomic dysfunction. The purpose of this study was to assess how yoga practices affected several physiological markers during academic exams and how stress affected them.
Materials and Methods: Thirty school-age children were randomly assigned to the yoga group and control group (16 & 14 respectively) for the study. For four weeks, the yoga group practiced integrated yoga for thirty-five minutes every day under the guidance of a yoga trainer. The control group did not engage in any form of stress reduction or yoga practice. At baseline and throughout the test, a few physiological indicators were measured, including heart rate, and respiration rate.
Results: Analysis of the pre and post data was done using SPSS software. ANCOVA statistical technique was used to analyze the data. During the examination stress, there was a considerable increase in physiological markers in the control group and no significant difference in the yoga group.
Conclusion: Exam stress autonomic alterations are resisted by yoga among school going children. Further research is recommended to validate these findings and explore the long-term effects of yoga practices on selected physiological parameters and management in educational settings.

Keywords: Yoga, stress, heart rate, respiratory rate, school children

Introduction

Stress is a psychophysiological process that is typically felt as an unpleasant emotional state. It's a frequent disorder when the body reacts in a variety of ways with chemicals and hormones to a perceived physical threat or psychological anguish. Stress primarily affects the immunological, cardiovascular, and autonomic systems in terms of health implications.

Yoga is an age-old discipline that originated in India and provides practitioners with both physical and mental well-being. The majority of the body's physiological systems have been demonstrated to be impacted by yoga. Yoga is an organized method for reaching higher states of awareness. It is the science of life and the perfect method to live, giving the body rhythm, the mind melody, the soul harmony, and life its symphony. Put simply, yoga is a means of achieving complete well-being, tranquillity, joy, and wisdom. Yoga's physical, mental, and spiritual components contribute to a meaningful, worthwhile, and honourable existence. As such, yoga is a philosophy, science, and art that affects man's existence on all levels. As a result, yoga's effects need to be felt in all aspect of our daily life.

Research has demonstrated that stress contributes significantly to immune response dysfunction by being linked to increased latent virus reactivation, upper respiratory tract infection, wound-healing delay, and upper respiratory tract infection. Compared to stress circumstances created in laboratories, academic stress - the stressful state that students experience when taking exams - can be thought of as a good model of naturalistic stress in humans. It is classified as an objective, discrete, short-term, nonsocial stress by Herbert and Cohen. Studies on examination stress in medical students by Danner *et al*. [9] and Shukla *et al*. have shown a considerable rise in blood pressure and pulse rate during exams when compared to baseline nonstressful circumstances.

Materials and Methods

Thirty volunteers who were school-age youngsters and free of acute or chronic physical illnesses participated in the study. As a result, the 10 to 18-year-old students that were chosen were all quite young. These pupils were divided into two groups at random: the yoga group (number 16) and the control group (number 14). During the study, all of the students underwent two assessments: one at enrollment (baseline levels when there was no test stress) and the other four weeks later during their exams (exam stress). For four weeks, the sixteen students who were part of the yoga group practiced integrated yoga for thirty-five minutes every day under the guidance of a yoga trainer. The control group did not practice any of the yogic techniques used by the yoga group; instead, they went about their everyday lives as usual.

The following yogic techniques were daily practiced by the subjects of yoga group

- Yogic prayer 2 minutes.
- *Sukshma Vyayam* (micro exercises) 6 minutes.
- *Sthula Vyayama* (macro exercises) 4 minutes.
- Asanas (postures) 12 minutes.
- Pranayama 4 minutes.
- Dhyana (meditation) 5 minutes.

Physiological parameters

Following appropriate calibration, physiology lab version 3.0 was used to measure physiological parameters such as heart rate and respiratory rate.

Statistical analysis

Data analysis was performed using SPSS version 20.0. Assessment of the impact of the intervention on the control group and the experimental group was done using the statistical technique of analysis of co-variance (ANCOVA). A significance level of $p<0.05$ was considered statistically significant, indicating differences in the outcomes of selected variables between the experimental and control groups before and after the intervention.

Results

Age, height, and weight of the study participants and the control group were matched. There was no discernible difference in the baseline values of heart rate and respiratory rate between the yoga group and the control group.

The analysis of descriptive statistics of two groups experimental and control are mentioned in Table 1. The mean heart rate post-intervention for the experimental group (n=16) was 81.437 (SD = 5.278). In comparison, the control group (n=14) exhibited a higher mean heart rate post-intervention, with a value of 86.000 (SD = 5.896). As shown in Table-2, the effect of group assignment (experimental vs. control) was significant (F = 5.726, p = 0.024), suggesting that there was a significant difference in post-intervention heart rate between the experimental and control groups, after controlling for pre-intervention scores

Changes in heart rate with examination stress

Table 1: Descriptive Statistics

Descriptive Statistics			
Dependent Variable: Post			
Group	**Mean**	**Std. Deviation**	**N**
Experimental	81.4375	5.27849	16
Control	86.0000	5.89654	14
Total	83.5667	5.94621	30

Table 2: ANCOVA Results

Tests of Between-Subjects Effects					
Dependent Variable: Post					
Source	**Type III Sum of Squares**	**DF**	**Mean Square**	**F**	**Sig.**
Corrected Model	231.912a	2	115.956	3.946	.031
Intercept	143.080	1	143.080	4.869	.036
Pre	76.483	1	76.483	2.603	.118
Group * Pre	168.286	1	168.286	5.726	.024
Error	793.455	27	29.387		
Total	210527.000	30			
Corrected Total	1025.367	29			
a. R Squared = .226 (Adjusted R Squared =.169)					

Changes in Respiratory rate with examination stress

The analysis of descriptive statistics of two groups experimental and control are mentioned in table-3. The mean Respiratory rate post-intervention for the experimental group (n=16) was 13.562 (SD = 2.731). In comparison, the control group (n=14) exhibited a higher mean respiratory rate post-intervention, with a value of 15.714 (SD = 2.301). As shown in Table-4, the effect of group assignment (experimental vs. control) was significant (F = 4.990, p = 0.034), suggesting that there was a significant difference in post-intervention heart rate between the experimental and control groups, after controlling for pre-intervention scores.

Table 3: Descriptive Statistics

Descriptive Statistics			
Dependent Variable: Post			
Group	**Mean**	**Std. Deviation**	**N**
Experimental	13.5625	2.73176	16
Control	15.7143	2.30146	14
Total	14.5667	2.72515	30

Table 4: ANCOVA Results

Tests of Between-Subjects Effects					
Dependent Variable: Post					
Source	**Type III Sum of Squares**	**DF**	**Mean Square**	**F**	**Sig.**
Corrected Model	34.641a	2	17.321	2.588	.094
Intercept	94.703	1	94.703	14.148	.001
Pre	.069	1	.069	.010	.920
Group * Pre	33.399	1	33.399	4.990	.034
Error	180.725	27	6.694		
Total	6581.000	30			
Corrected Total	215.367	29			
a. R Squared = .161 (Adjusted R Squared =.099)					

Discussion

The goal of the current investigation was to determine how autonomic and endocrine factors are affected by test stress and how yoga practices affect these same variables.

The control group of our study showed that during examination stress, there was a significant increase in respiratory rate (p<0.05) in the students who did not practice yoga. Conversely, during examination stress, students who practiced yoga showed a 1.74% decrease in heart rate, and a non-statistically significant decrease in respiratory rate when compared to baseline.

The rise in heart rate that we observed in the control group is consistent with previous research by Lovallo *et al*. Similar trends of elevated blood pressure, heart rate, and galvanic skin resistance during test stress were also noted by other researchers. Our research on the effects of yoga is consistent with previous studies by Hoenig, who demonstrated a drop in heart rate and suggested that the mechanism may be related to the Valsalva maneuver. Many researchers have hypothesized that the reason why yoga lowers heart rate is probably because the parasympathetic part of the hypothalamus is not affected by the regulation of the posterior or sympathetic area, which decreases sympathetic activity without changing parasympathetic activity.

Conclusion

Thus, the authors draw the conclusion that yoga significantly improves the autonomic, endocrine, and psychological alterations caused by the stress of exams. Yoga most likely affects the hypothalamus and anterior pituitary systems via the cerebro-cortico-limbic pathways. Thus, when the subject is faced with a threat, it regulates the HPA in a way that optimizes system activation and creates a balance between the sympathetic and parasympathetic limbs of the autonomic nervous system (which in this case is the examination stress). Therefore, compared to the control group, the participants who practice yoga do not exhibit as much of an increase in autonomic variables.

References

1. McEwen BS, Stellar E. Stress and the Individual. Mechanisms leading to disease. Arch Intern Med. 1993;153:2093-20101. Available from: PubMed, Google Scholar.
2. Glaser R, Kiecolt-Glaser JK, Speicher CE, Holliday JE. Stress, loneliness and changes in herpes virus latency. J Behav Med. 1985;8:249-260. Available from: PubMed, Google Scholar.
3. Cohen S. Psychological stress, immunity and upper respiratory infections. Curr Dir Psychol Sci. 1996;5:86-90. Available from: Google Scholar.
4. Kiecolt-Glaser JK, Marucha PT, Malarkey WB, Mercado AM, Glaser R. Slowing of wound healing by psychological stress. Lancet. 1995;60:362-365. Available from: PubMed, Google Scholar.
5. Marucha PT, Kiecolt-Glaser JK, Favagehi M. Mucosal wound healing is impaired by examination stress. Psychosom Med. 1998;60:362-365. Available from: PubMed, Google Scholar.
6. Solomon GF, Moss RH. Emotions, immunity and disease: A speculative theoretical integration. Arch Gen Psychiatry. 1964;11:657-674. Available from: PubMed, Google Scholar.
7. Guidi L, Tricerri A, Vangeli M, Frasca D, Errani AR, Giovanni AD, et al. Neuropeptide Y plasma levels and immunological changes during academic stress. Neuropsychobiology. 1999;40:188-195. Available from: PubMed, Google Scholar.
8. Herbert TB, Cohen S. Stress and immunity: A meta-analytic review. Psychosom Med. 1993;55:364-379. Available from: PubMed, Google Scholar.
9. Danner SA, Endert E, Koster RW, Dunning AJ. Biochemical and circulatory parameters during purely mental stress. Acta Med Scand. 1981;209:305-308. Available from: PubMed, Google Scholar.
10. Shukla N, Verma NS, Tandon SN, Khanna DN, Tewari S, Pande US, et al. Examination stress in medical students: A study. Indian J Med Sci. 1993;47:264-246. Available from: PubMed, Google Scholar.
11. Allen PI, Batty KA, Dodd CA, Hebert J, Hugh CJ, Moore GF, et al. Dissociation between emotional and endocrine response preceding an academic examination in male medical students. J Endocrinol. 1985;107:163-170. Available from: PubMed, Google Scholar.
12. Meyerhoff JL, Olehansky MA, Mougey EH. Psychologic stress increases plasma levels of prolactin, cortisol, and POMC-derived peptides in man. Psychosom Med. 1988;50:295-303. Available from: PubMed, Google Scholar.
13. Semple CG, Gray CE, Borland W, Espie CA, Beastall GH. Endocrine effects of examination stress. Clin Sci. 1988;74:255-259. Available from: PubMed, Google Scholar.
14. Glaser R, Pearl DK, Kiecolt-Glaser JK, Malarkey WB. Plasma cortisol levels and reactivation of latent Epstein Barr virus in response to examination stress. Psychoneuroendocrinology. 1994;19:765-772. Available from: PubMed, Google Scholar.
15. Russo-Marie F. Macrophages and the glucocorticoids. J Neuroimmunol. 1992;40:281-286. Available from: PubMed, Google Scholar.
16. Wu CY, Fargeas C, Nakajima T, Delespesse G. Glucocorticoids suppress the production of interleukin 4 by human lymphocytes. Eur J Immunol. 1991;21:2645-

2647. Available from: PubMed, Google Scholar.
17. Gallois PH, Forzy G, Dhont JL. Hormonal changes during relaxation. Encephale. 1984;10:79-82. French. Available from: PubMed, Google Scholar.
18. Whitehouse WG, Dinges DF, Orne EC, Keller SE, Bates BL, Bauer NK, et al. Psychological and immune effects of self hypnosis training for stress management through the first semester of medical school. Psychosom Med. 1996;58:249-263. Available from: PubMed, Google Scholar.
19. Shapiro SL, Schwartz GE, Bonner G. Effects of mindfulness based stress reduction in medical and paramedical students. J Behav Med. 1998;21:581-589. Available from: PubMed, Google Scholar.
20. Kamei T, Torimui Y, Kimura H, Ohno S, Kumano H, Kimura K. Decrease in serum cortisol during yoga exercise is correlated with alpha wave action. Percept Mot Skills. 2000;3:1027-1032. Available from: PubMed, Google Scholar.
21. Monro R, Power J, Coumar A, Nagarathna R, Dandona P. Yoga therapy for NIDDM: A controlled trial. Complement Med Res. 1992;6:66-68. Available from: Google Scholar.
22. Linn MW. A global assessment of recent stress (GARS) scale. Int J Psychiatry Med. 1985;15:47-59. Available from: PubMed, Google Scholar.
23. Speilberger CD, Gorsuch RL, Lushene R, Vagg R, Jacobs GS. Manual for the State-Trait Anxiety Inventory. California: Consulting Psychologists Press, Inc.; 1983. Available from: Google Scholar.
24. Lovallo WR, Pincomb GA, Edwards GL, Brackett DJ, Wilson MF. Work pressure and the type A behavior pattern exam stress in male medical students. Psychosom Med. 1986;48:125-133. Available from: PubMed, Google Scholar.
25. Harris A, Martin BJ. Increased abdominal pain during final examinations. Dig Dis Sci. 1994;39:104-108. Available from: PubMed, Google Scholar.
26. Malathi A, Damodaran A. Stress due to exams in medical students- role of yoga. Indian J Physiol Pharmacol. 1999;43:218-224. Available from: PubMed, Google Scholar.
27. Hoenig J. Medical research on Yoga. Confin Psychiatr. 1968;11:69-89. Available from: PubMed, Google Scholar.
28. Bagga OP, Gandhi A. A comparative study of the effect of Transcendental meditation and Shavasana practice on cardiovascular system. Indian Heart J. 1983;35:39-45. Available from: PubMed, Google Scholar.
29. Khanam AA, Sachdeva U, Gularia R, Deepak KK. Study of pulmonary and autonomic functions of asthma patients after yogic training. Indian J Physiol Pharmacol. 1996;40:318-324. Available from: PubMed, Google Scholar.
30. Vijaylakshmi P, Madanmohan, Bhavanani AB, Patil A, Babu K. Modulation of stress induced by isometric handgrip test in hypertensive patients following yogic relaxation training. Indian J Physiol Pharmacol. 2004;48:59-64. Available from: PubMed, Google Scholar.
31. Vassend O, Halvorsen R, Norman N. Hormonal and psychological effects of examination stress. Scand J Psychol. 1987;28:75-82. Available from: PubMed, Google Scholar.
32. Arndt CB, Guly UM, McManus IC. Preclinical anxiety: The stress associated with a viva voce examination. Med Educ. 1986;20:274-280. Available from: PubMed, Google Scholar.
33. de Pablo J, Subira S, Martin MJ, de Flores T, Valdes M. Examination associated anxiety in students of medicine. Acad Med. 1990;65:706-707. Available from: PubMed, Google Scholar.
34. Woolery A, Myers H, Sternlib B, Zeltzer L. A yoga intervention for young adults with elevated symptoms of depression. Altern Ther Health Med. 2004;10:60-63. Available from: PubMed, Google Scholar.
35. Johansson GG, Karonen SL, Laasko ML. Reversal of an elevated plasma level of prolactin during prolonged psychological stress. Acta Physiol Scand. 1983;119:463-464. Available from: PubMed, Google Scholar.
36. Schmidt T, Wijga A, Von Zur Muhlen A, Brabant G, Wagner TO. Changes in cardiovascular risk factors and hormones during a comprehensive residential three month kriya yoga training and vegetarian nutrition. Acta Physiol Scand Suppl. 1997;640:148. Available from: PubMed, Google Scholar.
37. Paik I, Toh KY, Lee C, Kim JJ, Lee SJ. Psychological stress may induce increased humoral and decreased cellular immunity. Behav Med. 2000;26:139-141. Available from: PubMed, Google Scholar.
38. Halvorsen R, Vassend O. Effects of examination stress on some cellular immunity functions. J Psychosom Res. 1987;31:693-701. Available from: PubMed, Google Scholar.
39. Dobbin JP, Harth M, McGrain GA, Martin RA, Cousin K. Cytokine production and lymphocyte transformation during stress. Brain Behav Immun. 1991;5:339-348. Available from: PubMed, Google Scholar.
40. Cupps TR, Fauci AS. Corticosteroid mediated immunoregulation in man. Immunol Rev. 1982;65:133-55. Available from: PubMed, Google Scholar.
41. Mason D. Genetic variation in the stress response; Susceptibility to experimental allergic encephalomyelitis and implications for human inflammatory disease. Immunol Today. 1991;12:57-60. Available from: PubMed, Google Scholar.