



Enhancing Respiratory Function and Cardiovascular Endurance through Intensive Yogic Intervention: A Comprehensive Study

Tarak Nath Pramanik^{1ABCDE}, Aminur Rahaman^{1ABCDE}, Md. Hamidur Rahman^{2ABCDE}, Akash Shukla^{1ABCDE} and Punam Pradhan^{1ABCDE}

¹University of Delhi

²Jashore University of Science and Technology

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Corresponding Author: Tarak Nath Pramanik, E-mail: dr.taraknath@gmail.com

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Abstract

Background. Optimal respiratory function and cardiovascular endurance are integral to overall health and athletic performance. Yogic interventions have emerged as potential strategies to enhance physiological and physical parameters. These metrics not only unlock the human body's potential but also play a vital role in increasing sports performance.

Objectives. This study aimed to evaluate the effectiveness of a structured yogic regimen in improving respiratory function and cardiovascular endurance in young male adults, shedding light on yoga's role as a complementary approach to physical fitness enhancement.

Materials and methods. Forty (N = 40) male undergraduate university students (aged 18 to 25 years) were randomly assigned to the experimental (n = 20) and control group (n = 20). The experimental investigation centered on vital capacity (VC), both positive and negative breath holding times (PBHT and NBHT), peak flow rate (PFR), and cardiovascular endurance (CVE). Using an analytical research approach, a randomized pre-test – post-test – controlled group design was implemented. The experimental group engaged in daily yoga sessions supervised by certified instructors, incorporating various asanas, pranayama techniques, and meditation, while the control group maintained their regular lifestyle. Pre-and post-intervention assessments of respiratory parameters and cardiovascular endurance were conducted using standardized tests. Statistical analyses, including Levene's test for normality, and paired t-tests for intra-group comparisons, were performed using SPSS software (IBM, version 25, Chicago). The experiment lasted for six weeks, with a significance level set at $\alpha = 0.05$.

Results. The paired t-test analyses demonstrated significant improvements in VC $t_{(19)} = 4.96$, and $p < 0.000$; PBHT $t_{(19)} = 6.34$, and $p < 0.000$; NBHT $t_{(19)} = 4.18$, and $p < 0.001$; PFR $t_{(19)} = 7.02$, and $p < 0.000$; as well as CVE $t_{(19)} = 3.96$, and $p < 0.001$, within the experimental group. Conversely, no significant changes were observed in the control group.

Conclusions. The findings underscore the effectiveness of a six-week yogic intervention in enhancing respiratory function and cardiovascular endurance among young male adults. Integrating yoga into exercise routines may yield substantial benefits for physical fitness improvement.

Keywords: yogic intervention, respiratory function, cardiovascular endurance, physical fitness, undergraduate students.

Introduction

Air pollution is a major health hazard, exposing individuals to fine particles that infiltrate the lungs and

cardiovascular system, leading to conditions such as stroke, heart disease, lung cancer, chronic obstructive pulmonary diseases, and respiratory infections (WHO, n.d.). It is the biggest environmental risk to public health in the world, thought to be the reason for 7 million preventable deaths every year (UNEP, 2021). Specifically, indoor air pollution contributes to 4-6% of India's national disease burden. In response to these health challenges, yoga has

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been recognized as an effective way to boost respiratory efficiency and strengthen the immune system against environmental hazards (Balaguru et al., 2022). Regular yoga practice significantly improves respiratory function and cardiovascular endurance, enhancing breathing, lung function, and oxygen delivery to muscles during exercise (Beutler et al., 2016; Kothari et al., 2023; Selmann et al., 2020). Moreover, yoga has been shown to increase cardiovascular endurance by boosting cardiac stroke volume and lowering blood pressure (Kothari et al., 2023; Santaella et al., 2011). Yoga, originating in ancient India millennia ago, is a holistic practice uniting the body, mind, and spirit, as the term “yoga” means to yoke or unite (Cameron, 2023). In recent years, yoga has surged in global popularity, evolving from a physical exercise to a holistic method for enhancing mental health benefit and physical well-being (Pramanic et al., 2024). It comprises physical postures (asanas), breathwork (pranayama), meditation, and ethical principles, aiming to improve overall health, mental clarity, emotional stability, and spiritual harmony (Cameron, 2023). Patanjali’s holistic approach to yogic practices encompasses both mental mastery and stress regulation (Sonwane & Mishra, 2016). Notably, Pranayama breathing exercises in yoga significantly boost oxygen intake, enriching the blood for essential organs like the brain, heart, and lungs, thereby enhancing their function. This improved oxygenation leads to better cardiorespiratory fitness by enhancing oxygen flow to the brain, regulating breathing, and reducing strain on the heart, resulting in enhanced endurance and cardiovascular fitness (Kothari et al., 2023).

The human respiratory system, encompassing both the upper and lower tracts, serves as the conduit for essential gas exchange between the body and the environment, a process vital for overall health. Additionally, it plays a pivotal role in evaluating lung function and efficiency (Islam et al., 2020). This system’s impact on sports performance is multifaceted. For example, improving lung capacity and respiratory health can augment endurance by facilitating increased oxygen delivery to muscles during physical activity (Ardejani & Saleem, 2022). Furthermore, the respiratory system’s ability to adapt to altitude and temperature variations is crucial for athletic prowess (Ardejani & Saleem, 2022). Key respiratory parameters such as vital capacity, respiratory rate, and breath-holding capabilities significantly contribute to enhanced endurance and improved cardiovascular fitness.

Vital capacity (VC), a crucial measure of lung function, is often assessed through spirometry, with a typical range of 3.5-4.5 liters (David & Sharma, 2023). Comprising inspiratory reserve volume, tidal volume, and expiratory reserve volume, VC tends to be greater in taller individuals and declines with age (Bhatti et al., 2014). Restrictive lung diseases significantly reduce VC due to decreased lung volumes and hindered expansion (Lutfi, 2017; Martinez-Pitre et al., 2023). Crucial for respiratory health, VC significantly impacts physical performance, especially in sports, facilitating better oxygen distribution to muscles during exercise (Taneja & Bose, 2019). Athletes with larger VC often excel due to their ability to intake more air, sustaining high-performance levels (Taneja & Bose, 2019; Mazic et al., 2015). Research indicates that yoga practices, including SN, asanas, and pranayama, can enhance VC, as demonstrated in college students (Birkel & Edgren, 2000).

Additionally, a study published in the *National Journal of Physiology, Pharmacy, and Pharmacology* affirms yoga’s positive impact on respiratory function and VC (Kondam et al., 2015). These findings emphasize the beneficial role of yoga in promoting lung health and enhancing vital capacity.

Respiratory rate, or the frequency of breaths per minute, is a critical indicator of health, with norms ranging from 12 to 20 breaths per minute for adults and varying by age in children (Rowden, 2023). Measurement methods encompass manual counting via observing chest movements and automated devices tracking breathing patterns (Singh et al., 2020). Various factors including age, activity level, and environmental conditions influence respiratory rate, which can also be elevated due to allergic reactions, anxiety, fever, or cardiac issues (Rowden, 2023). Furthermore, respiratory rate significantly impacts sports performance, encompassing physical, physiological, and mental aspects (Migliaccio et al., 2023). Employing proper breathing techniques, such as deep, slow breathing, aids athletes in managing stress and anxiety by inducing a calming effect on the nervous system, particularly beneficial during pre-game jitters or competitive situations. Moreover, yogic practices like Suryanamaskar, asanas, and pranayama have been documented to positively influence respiratory rates. A study highlighted in the *International Journal of Economic Perspectives* (Kumar & Tak, 2021) underscored the beneficial impact of these practices on respiratory rates.

Positive breath-holding times (PBHT) and negative breath-holding times (NBHT) measure breath duration after inhaling and exhaling. Breath-holding time, a metric measuring respiratory endurance and lung efficiency, has been widely explored in various contexts. Ideguchi et al. (2021) and Hedhli et al. (2021) found that individuals with chronic obstructive pulmonary disease exhibit shorter breath-holding times compared to healthy counterparts. Additionally, studies such as Yildiz et al. (2020) have utilized breath-holding time to investigate the impact of stroke and aging on lung function. Moreover, breath-holding exercises have emerged as a promising avenue for improving respiratory capacity and oxygen utilization, particularly beneficial for endurance athletes engaged in activities like running, cycling, or swimming (Fernández et al., 2022). Notably, practices such as yoga, particularly Pranayama, have shown significant potential in enhancing breath-holding capacity. Singh et al. (2022) demonstrated that a six-week Pranayama training program notably improved breath-holding among soccer players compared to control groups. This suggests a tangible link between breath-holding exercises, such as Pranayama, and enhanced respiratory endurance, which can be advantageous for athletes seeking to optimize their performance.

Peak flow rate (PFR), measures the maximum exhaling speed in L/min and helps assess lung function and respiratory disease severity (DeVrieze et al., 2023). PFR are crucial indicators of respiratory health, varying based on factors like age, height, sex, and race. While adults typically range between 400-700 L/min, children usually fall between 150-450 L/min. The research underscores the significance of PFR in sports performance, particularly in activities requiring endurance and efficient breathing. Studies have consistently shown that higher PFR values, indicative of superior respiratory function, directly correlate with enhanced

athletic abilities (Mackala et al., 2019; Kurtoğlu et al., 2024; Lydia & Latha, 2019). Furthermore, yoga has emerged as a promising avenue for improving PFR and overall lung function. Agnihotri et al. (2016) demonstrated that yoga significantly enhanced peak expiratory flow rate in patients with mild to moderate persistent chronic bronchial asthma. Similarly, a study published by Abel et al. (2013) found that regular yoga practice led to notable improvements in pulmonary function, as assessed by peak expiratory flow rate. These findings underscore the potential of yoga as a complementary approach to enhance respiratory health and athletic performance.

Furthermore, cardiovascular endurance (CVE), a cornerstone of health-related fitness, is essential for overall well-being and also has an impact on game performance (Reza et al., 2024). It encompasses the coordinated functioning of the heart, lungs, and circulation to deliver oxygen during physical exertion. Through regular training, the heart becomes stronger, thereby reducing the risk of heart disease. Moreover, enhancing cardiovascular endurance not only contributes to better health but also elevates athletic performance by enabling athletes to sustain high-intensity activities over prolonged periods. Interestingly, recent research underscores the efficacy of yoga in augmenting cardiovascular endurance, surpassing conventional aerobic exercises recommended for cardiovascular health (Sovová et al., 2015). Specifically, a study by Satheesh and Bindu (2020) unveiled that consistent pranayama practice enhances cardiovascular efficiency and physical endurance among young, healthy individuals. This evidence underscores the multifaceted benefits of incorporating yoga, particularly pranayama, into fitness routines for promoting cardiovascular health and endurance.

This study aims to assess how a structured six-week yoga program impacts vital parameters including VC, PBHT, NBHT, PFR, and CVE. By analysing these changes, it seeks to offer empirical evidence of yoga's effectiveness in enhancing respiratory function and cardiovascular endurance. This research contributes to our understanding of yoga's physiological benefits and its potential as a non-invasive health intervention.

Materials and Methods

Selection of Subjects

Forty (N = 40) male undergraduate university students, aged 18 to 25 years, were enlisted from University of Delhi, India. They were randomly divided into two groups: the control group (n=20) and the experimental group (n=20). The study was conducted at the yoga laboratory of the Indira

Table 1. Demographic data of the initially randomized sample (Mean ± SD)

Sl. No.	Baseline characteristics	Experimental Group (n = 20)	Control Group (n = 20)
1	Age (yrs.)	21.20 ± 2.14	22.32 ± 1.59
2	Weight (kg)	57.56 ± 5.62	63.00 ± 4.71
3	Height (m)	1.66 ± 0.07	1.67 ± 0.08
4	BMI (kg/m ²)	21.87 ± 1.74	22.58 ± 1.81

Gandhi Institute of Physical Education and Sports Sciences, University of Delhi. Throughout the testing, the participants did not smoke or use alcohol, and they did not have any acute or chronic diseases or medication use. Their vision was also normal. Participants provided written informed consent after being informed about the study's details.

Experimental Design

The study employed an analytical research approach, utilizing an experimental method known as the randomized pre-test – post-test – controlled group design, also recognized as the True experimental design. It aimed to investigate whether a six-week yogic intervention could effectively enhance specific respiratory parameters and cardiovascular endurance. The sample selection process involved utilizing probability sampling methods from the population.

Experimental protocol

The experimental group underwent a structured yoga intervention comprising Yogic Prayer, Suryanamaskar, and a variety of yoga asanas including Ardha-Halāsana, Sarvangāsana, Matsyāsana, Halāsana, Chakrasana, Bhujangāsana, Shalvhasana, Naukasana, Dhanurasana, ArdhaMatsyendrasana (Left and Right), Paschimottanasana, Vajrasana, Yogamudra, Ushtrasana, Padmasana, Utkatasana, Trikonasana, Vrikkhasana, Tadasana, and Shavasana. Additionally, Pranayama techniques such as AnulomVilom Pranayama and Bhastrika Pranayama, along with meditation, were included. This regimen was conducted daily from 7:30 am to 8:30 am at the yoga lab, IGIPES, University of Delhi, supervised by certified yoga instructors. The control group, on the other hand, continued with their regular activities without any additional intervention. All participants' metrics were assessed both before the intervention and after six weeks for comparison. The specifics of the intervention are summarized in Table 2.

Table 2. Brief yoga intervention module

Sequence	List Yoga Practices	Time duration (60 min)	Schedule
1	Yogic prayer	5 min	
2	Surya Namaskar	10 min	Monday, Tuesday
3	Asanas	25 min	Wednesday,
4	Pranayama	15 min	Thursday, Friday,
5	Meditation	5 min	and Saturday

Instrument and Tools

A wet spirometer was used to measure vital capacity, which was recorded in liters. Breath-holding time, encompassing both inhalation (positive breath-hold time) and exhalation (negative breath-hold time) phases, was timed to the nearest second with a stopwatch. Peak expiratory flow rate was determined using a Wright Peak Flow Mini-meter (ARMED, Clement Clarke Int. Ltd, England) and recorded in liters per minute (L/min). Cardiovascular endurance was evaluated through the Harvard Step Test, utilizing equipment such as a stopwatch, a bench (20 inches high

for boys and 16 inches high for girls), and a metronome. The Physical Fitness Index (PFI), as delineated by Fox et al. (1973), was computed using the following formula: Physical Fitness Index = Duration of exercise period in seconds \times 100 / ($2 \times$ Sum of three pulse counts after exercise).

Test Administration

To measure vital capacity, participants were seated comfortably and instructed to follow a demonstrated procedure. They took a deep breath, held it, and then exhaled forcefully into a spirometer. The highest value from three trials, with less than a ten percent variance, was recorded (Balaguru et al., 2022). Breath-holding time was assessed by timing how long participants could hold their breath after inhaling fully (positive) or exhaling completely (negative), and this was done to ensure no hyperventilation or movement during the test, and participants used a nose clip (Bagade et al., 2018). The peak flow rate was determined using a Mini-Wright peak flow meter. Participants exhaled through a mouthpiece to measure the maximum airflow (Oza et al., 2019). The respiratory rate was calculated by counting breaths for one minute while participants were at rest. Cardiovascular endurance was evaluated with the Harvard Step Test. Participants stepped in sync with a metronome for five minutes, and their pulse was recorded at specific intervals post-exercise to calculate a fitness index (Kaur & Mithlesh, 2023).

Statistical Analysis

In this study, statistical analyses were conducted using SPSS software (IBM, version 22, Chicago). The normality of the data was verified through Levene's test, confirming adherence to a normal distribution. Paired sample t-tests were employed to analyse respiratory functions and cardiovascular endurance. A significance level of 0.05 was set for this research. Given the normal distribution of the data, results are presented as mean (M) and standard deviation (SD).

Results

In Table 3, the descriptive statistics for the EG and CG illustrate changes across five variables from pre-test to post-test. In the EG, the mean values for VC increased from 2.22 to 2.28, while in the CG, the values increased slightly from 2.20 to 2.23. PBHT showed a notable increase in the EG from 28.59 to 31.45, whereas the CG only increased marginally from 34.02 to 34.68. NBHT also improved in the EG from 24.11 to 26.61, compared to a smaller increase in the CG from 23.01 to 24.96. For PFR, the EG saw a rise from 3.96 to 4.63, while the CG had a slight decline from 3.79 to 3.71. CVE improved significantly in the EG from 55.61 to 60.38, contrasted with a moderate increase in the CG from 53.28 to 55.93. These statistics indicate that the intervention had a more substantial positive impact on the EG compared to the CG across all measured health variables, suggesting its effectiveness in improving respiratory and cardiovascular health metrics.

Table 3. Descriptive statistics for the five variables between the pre-test and post-test of the experimental and control groups

Variables	Group	Test	N	Mean	Std. Deviation	Std. Error Mean
VC	EG	Pre-test	20	2.22	0.21	0.05
		Post-test	20	2.28	0.20	0.05
	CG	Pre-test	20	2.20	0.33	0.08
		Post-test	20	2.23	0.32	0.07
PBHT	EG	Pre-test	20	28.59	9.47	2.12
		Post-test	20	31.45	9.42	2.10
	CG	Pre-test	20	34.02	11.95	2.67
		Post-test	20	34.68	11.51	2.57
NBHT	EG	Pre-test	20	24.11	7.06	1.58
		Post-test	20	26.61	7.38	1.65
	CG	Pre-test	20	23.01	8.66	1.94
		Post-test	20	24.96	5.77	1.29
PFR	EG	Pre-test	20	3.96	1.06	0.24
		Post-test	20	4.63	1.09	0.24
	CG	Pre-test	20	3.79	0.82	0.18
		Post-test	20	3.71	0.93	0.21
CVE	EG	Pre-test	20	55.61	7.75	1.73
		Post-test	20	60.38	8.26	1.85
	CG	Pre-test	20	53.28	11.90	2.66
		Post-test	20	55.93	14.06	3.14

Key: VC: Vital Capacity; PBHT: Positive Breath Holding Time; NBHT: Negative Breath Holding Time; PFR: Peak Flow Rate; CVE: Cardiovascular Endurance; EG: Experimental Group; CG: Control Group

Table 4. Paired sample t-test for the five variables between the pre-test and post-test of the experimental and control groups

Variables	Group	Test	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
VC	EG	Pre-test	0.07	0.06	0.01	4.96	19	0.000*
		Post-test						
	CG	Pre-test	0.04	0.22	0.05	0.72	19	0.482
		Post-test						
PBHT	EG	Pre-test	2.85	2.01	0.45	6.34	19	0.000*
		Post-test						
	CG	Pre-test	0.66	1.70	0.38	1.73	19	0.099
		Post-test						
NBHT	EG	Pre-test	2.50	2.68	0.60	4.18	19	0.001*
		Post-test						
	CG	Pre-test	1.94	6.23	1.39	1.40	19	0.179
		Post-test						
PFR	EG	Pre-test	0.68	0.43	0.10	7.02	19	0.000*
		Post-test						
	CG	Pre-test	0.08	0.32	0.07	1.06	19	0.302
		Post-test						
CVE	EG	Pre-test	4.77	5.39	1.20	3.96	19	0.001*
		Post-test						
	CG	Pre-test	2.65	6.80	1.52	1.74	19	0.098
		Post-test						

*Significant at 0.05 level

In Table 4, the paired t-test analysis results indicate significant differences in several physiological and physical fitness parameters between the pre-test and post-test within the EG, but not in the CG. For the VC variable, the EG showed a significant increase, $t_{(19)} = 4.96$, and $p < 0.000$, whereas the CG did not show a significant change, $t_{(19)} = 0.72$, and $p > 0.482$. Similarly, the PBHT in the EG had a significant improvement, $t_{(19)} = 6.34$, and $p < 0.000$, with no significant change in the CG, $t_{(19)} = 1.73$, and $p > 0.099$. For the NBHT, the EG also exhibited significant improvement, $t_{(19)} = 4.18$, and $p < 0.001$, while the CG did not change, $t_{(19)} = 1.40$, and $p > 0.179$. PFR significantly increased in the EG, $t_{(19)} = 7.02$, and $p < 0.000$, but not in the CG, $t_{(19)} = 1.06$, and $p > 0.302$. Lastly, CVE showed a significant increase in the EG, $t_{(19)} = 3.96$, and $p < 0.001$, with no significant change in the CG, $t_{(19)} = 1.74$, and $p > 0.098$. These results suggest that the experimental intervention was effective in improving the measured physiological and physical fitness parameters in the experimental group.

Discussion

The paired sample t-test results presented in Table 4 indicate significant differences in the five measured variables between the pre-test and post-test for the experimental group (EG), but not significant differences in the control group (CG). These findings provide insights into the effects of the intervention on various physiological parameters.

In the conducted study, it was observed that the experimental group exhibited a notable enhancement in VC from the initial assessment to the subsequent one. This observed increase strongly suggests that the intervention administered had a beneficial impact on the VC levels of the participants. This finding aligns with several prior studies which have also highlighted the positive influence of yogic practices on VC. For instance, a study reported a significant improvement in vital capacity among students participating in a yogic practices program (Jothipriya & Thanigaikoumarane, 2013). Similarly, another study documented that yogic exercises notably augmented both vital capacity in healthy subjects (Yadav & Das, 2001). Furthermore, 2-month regimen of pranayama and suryanamaskar practices led to a significant increase in vital capacity among medical students. The study concluded that such practices enhance respiratory breathing capacity by promoting chest wall expansion and augmenting forced expiratory lung volumes (Karthik et al., 2014).

The intervention group demonstrated a noteworthy enhancement in both PBHT and NBHT, underscoring the effectiveness of the intervention in augmenting these parameters. Conversely, the control group exhibited no significant variation in PBHT and NBHT from the pre-test to the post-test. Various scientific inquiries into yogic practices consistently affirm their beneficial impact on breath-holding times. For example, a study focusing on Pranayama revealed substantial increases in breath-holding time among

participants who engaged in this technique for 45 minutes, five days a week, over six weeks (Sivapriya & Veerapandian, 2017). Similarly, research on Anulom Vilom demonstrated improved lung function and endurance among competitive swimmers, potentially contributing to heightened breath-holding capacities. Moreover, yogic breathing exercises, including Pranayama, boosted negative breath-holding time in individuals coping with chronic respiratory ailments (Baghel & Shamkuwar, 2017).

The study revealed a significant improvement in the PFR of participants in the experimental group, indicating the effectiveness of the intervention in enhancing respiratory function. In contrast, the control group exhibited no significant change in PFR, emphasizing the importance of the intervention for meaningful improvement. These findings are reinforced by several other studies. A study examined the impact of yoga on respiratory functions in middle-aged individuals who were previously inactive. It found that both yoga asanas and pranayama led to improvements in overall respiratory function, including PFR (Yamamoto-Morimoto et al., 2019). Similarly, research by Arumugam and Anuja demonstrated a significant increase in peak expiratory flow values following yoga pranayama exercises (Arumugam & Anuja, 2016). Another study highlighted the positive effects of pranayama on the respiratory system, including improved PFR and respiratory muscle strength (Arulmozhi et al., 2018). Furthermore, a comparison between yogic practitioners and sedentary individuals revealed notably higher PFR values among those who practiced yoga (Vedala et al., 2014), suggesting the benefits of yoga for lung function even in healthy individuals without respiratory conditions. Additionally, a study concluded that a six-week yogic intervention could lead to significant enhancements in pulmonary function, including PFR, in physically fit individuals (Bhagel et al., 2022).

The intervention yielded a notable increase in CVE within the experimental group, affirming its positive impact. This improvement in CVE can be attributed primarily to the intervention, as evidenced by several studies highlighting the beneficial effects of yogic practices. For instance, a significant enhancement in cardiovascular endurance among college students following yogic practices (Vallimurugan & Vidhya, 2024). Similarly, another study conducted by Malik and Goel in 2015 revealed that yogic practices led to significant improvements in cardiovascular endurance and body composition within the experimental group when compared to the control group. Furthermore, a study featured in the *Preventive Cardiology* journal demonstrated that yoga practice substantially enhances various health-related aspects of physical fitness, including cardiovascular endurance, particularly among young, healthy individuals (Tran et al., 2001). These findings collectively highlight the positive influence of yogic practices on cardiovascular endurance.

Conclusions

Overall, the results from the paired sample t-tests indicate that the intervention was effective in significantly improving all measured variables (VC, PBHT, NBHT, PFR, and CVE) in the experimental group. These improvements were not observed in the control group, which did not undergo the intervention. This suggests that the intervention

had a substantial and positive impact on the participants' respiratory capacities and cardiovascular endurance, as evidenced by the statistically significant changes in the experimental group's pre-test and post-test scores across all variables. Future research should explore the long-term effects of yoga across diverse populations and refine intervention protocols for maximal efficacy.

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Conflicts of interest

The authors declare no conflicts of interest.

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Покращення показників дихальної функції та витривалості серцево-судинної системи за допомогою інтервенції з інтенсивної практики йоги: Комплексне дослідження

Тарак Натх Праманік^{1ABCDE}, Амінур Рахаман^{1ABCDE}, Мд. Гамідур Рахман^{2ABCDE}, Акаш Шукла^{1ABCDE}, Пунам Прадхан^{1ABCDE}

¹Делійський університет

²Джашорський університет науки і технологій

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 9 с., 4 табл., 55 джерел.

Історія питання. Оптимальні показники дихальної функції та витривалості серцево-судинної системи є невід'ємною частиною загального стану здоров'я та спортивної продуктивності. Інтервенції з практики йоги розглядаються як потенційна стратегія для поліпшення фізіологічних і фізичних параметрів. Такі показники не лише розкривають потенціал людського організму, але й відіграють ключову роль у досягненні високих спортивних результатів.

Мета дослідження. Метою цього дослідження була оцінка ефективності структурованого режиму занять йогою щодо покращення показників дихальної функції та витривалості серцево-судинної системи у молодих чоловіків, а також висвітлення ролі йоги як додаткового підходу до підвищення рівня фізичної підготовленості.

Матеріали та методи. Сорок (N = 40) студентів бакалаврату чоловічої статі (віком від 18 до 25 років) були розподілені методом рандомізації на експериментальну (n = 20) та контрольну (n = 20) групи. Експериментальне дослідження було зосереджено на оцінці показників життєвої ємності легень (ЖЕЛ), часу затримки дихання на позитивному та негативному рівнях (ПЧЗД та НЧЗД), пікфлоуметрії (ПФМ) — методика діагностики функції зовнішнього дихання, яка визначає пікову об'ємну швидкість видиху, а також витривалості серцево-судинної системи (ВССС). Застосовуючи аналітичний дослідницький підхід, було впроваджено модель рандомізованого передтестового та післятестового контрольованого дослідження в групах. Експериментальна група щоденно займалась йогою під наглядом сертифікованих інструкторів, включаючи виконання різних типів асан, технік пранаями та медитації, тоді як контрольна група дотримувалась свого звичного способу життя. Оцінка параметрів дихання та витривалості серцево-судинної системи до і після інтервенції проводилася шляхом застосування стандартизованих тестів. Статистичні методи аналізу, включаючи тест Левене на визначення критерію нормальності та використання t-критерію парних вибірок для внутрішньогрупових порівнянь, проведено за допомогою програмного забезпечення SPSS (IBM, версія 25, Чикаго). Експеримент тривав шість тижнів, рівень значущості був встановлений на рівні $\alpha = 0,05$.

Результати. Аналіз із використанням t-критерію парних вибірок продемонстрував значні покращення показників в експериментальній групі: ЖЕЛ $t_{(19)} = 4,96$, $p < 0,000$; ПЧЗД $t_{(19)} = 6,34$, $p < 0,000$; НЧЗД $t_{(19)} = 4,18$, $p < 0,001$; ПФМ $t_{(19)} = 7,02$, $p < 0,000$; а також ВССС $t_{(19)} = 3,96$, $p < 0,001$. Натомість у контрольній групі суттєвих змін не спостерігалось.

Висновки. Результати дослідження підкреслюють ефективність інтервенції з виконання шеститижневих занять йогою з метою зміцнення дихальної функції та витривалості серцево-судинної системи серед молодих чоловіків. Інтеграція йоги до режиму щоденних фізичних вправ має значні переваги щодо покращення показників фізичної підготовленості.

Ключові слова: інтервенція з практики йоги, дихальна функція, витривалість серцево-судинної системи, фізична підготовленість, студенти бакалаврату.

Information about the authors:

Pramanik, Tarak Nath: dr.tarakanath@gmail.com; <https://orcid.org/0009-0008-9322-6776>; Indira Gandhi Institute of Physical Education and Sports Sciences, University of Delhi, Benito Juarez Marg, South Campus, South Moti Bagh, New Delhi, Delhi 110021, India.

Rahaman, Aminur: aminur.rahaman844@gmail.com; <https://orcid.org/0000-0003-2248-845X>; Department of Physical Education and Sports Sciences, University of Delhi, Benito Juarez Marg, South Campus, South Moti Bagh, New Delhi, Delhi 110021, India.

Rahman, Md. Hamidur: hamid.pess.just@gmail.com; <https://orcid.org/0000-0002-0101-8822>; Department of Physical Education and Sports Science, Jashore University of Science and Technology, Churamonkathi, Ambottola, Jashore 7408, Bangladesh.

Shukla, Akash: akashshukla480@gmail.com; <https://orcid.org/0009-0002-0164-7706>; Department of Physical Education and Sports Sciences, University of Delhi, Benito Juarez Marg, South Campus, South Moti Bagh, New Delhi, Delhi 110021, India.

Pradhan, Punam: punampradhan746@gmail.com; <https://orcid.org/0009-0003-7410-4419>; Department of Physical Education and Sports Sciences, University of Delhi, Benito Juarez Marg, South Campus, South Moti Bagh, New Delhi, Delhi 110021, India.

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