Physical Education Theory and Methodology
Теорія та методика фізичного виховання

ISSN 1993-7989 (print)
ISSN 1993-7997 (online)
ISSN-L 1993-7989

Original Scientific Article

Yogic Practices as a Complementary Approach to Physical Fitness: An Intervention Study

Tarak Nath Pramanik[1ABCDE], Aminur Rahaman[1ABCDE], Gopal Chandra Saha[2ABCDE], Anupam Roy[3ABCDE] and Punam Pradhan[1ABCDE]

[1]University of Delhi
[2]Visva-Bharati University
[3]University of Kalyani

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Tarak Nath Pramanik, e-mail: dr.taraknath@gmail.com
Accepted for Publication: December 16, 2024
Published: January 30, 2025

DOI: 10.17309/tmfv.2025.1.14

Abstract

Background. Yoga is an ancient practice that has gained attention for its potential benefits on muscular strength and endurance, flexibility, power, agility, balance, reaction time, and body mass index (BMI), making it an effective complementary approach for improving overall health and physical fitness.

Objectives. This study aimed to evaluate the effects of a six-week yogic regimen on overall health and physical fitness in male university students.

Materials and methods. Forty male students, aged 18 to 24, from the University of Delhi were randomly assigned to an experimental group or a control group, each comprising 20 participants. The experimental group underwent a six-week yogic intervention, including asanas, pranayama, and meditation, conducted daily under the guidance of certified instructors. The control group continued their usual daily routines. Pre- and post-intervention measurements were conducted to assess muscular strength, muscular endurance, flexibility, power, agility, balance, reaction time, and BMI. Data analysis involved both descriptive statistics and inferential statistics (paired and independent sample t-tests) using SPSS software (version 25), with a significance level set at $\alpha = 0.05$.

Results. The experimental group showed considerable improvements in muscular strength, muscular endurance, flexibility, power, agility, balance, reaction time, and BMI ($p < .005$). In contrast, the control group did not exhibit any notable changes in these parameters. Pre-test comparisons revealed no substantial differences between the experimental and control groups across any variables. However, post-test comparisons between the groups demonstrated significant differences in several key areas: muscular strength, muscular endurance, balance, and reaction time ($p < .005$). Conversely, no major differences were observed in flexibility, power, agility, or BMI ($p > .005$).

Conclusions. A six-week yogic intervention effectively enhances muscular strength, muscular endurance, flexibility, power, agility, balance, and reaction time, while reducing BMI in university students. Incorporating yoga into physical education and individualized training programs has the potential to significantly enhance fitness outcomes across diverse populations.

Keywords: yogic practice, muscular strength, muscular endurance, university student, physical fitness.

Introduction

Globally, young adults increasingly suffer from lifestyle disorders such as heart disease, stroke, metabolic syndrome, chronic obstructive pulmonary disease, obesity, diabetes, and several forms of cancer (Sahu et al., 2024). These conditions not only impair physical health but also cause significant social and economic challenges (Bhavanani, 2017). A primary contributor to this trend is the rise in sedentary activities among teenagers and young adults. Academic demands and extensive use of technology have significantly increased time spent sitting or engaging in low-

intensity activities, which has led to adverse health effects (Zhu, 2021). A sedentary childhood can harm heart health in adolescence and raise the risk of future cardiovascular diseases. To address these trends, schools and universities should implement inclusive physical education programs that promote fitness, skill development, and enjoyment for students of all fitness levels and interests (Neil-Sztramko et al., 2021).

One of the most significant health challenges facing college students today is the decline in physical activity levels. Research indicates that a substantial number of students do not meet the recommended activity guidelines, with approximately 46.7 % of university students engaging in insufficient physical activity (Kljajević et al., 2021). Core fitness is crucial for athletes, as it significantly influences their performance and well-being, directly affecting game-specific strategies and tactics (Reza et al., 2024). Healthy individuals can accomplish daily tasks energetically while reducing the risk of health problems (Berduszek et al., 2021). Regular physical activity is essential for athletes to maintain peak health, which is necessary for optimal performance. A well-rounded fitness and flexibility training program can enhance muscle strength, flexibility, and coordination, thereby reducing the risk of injury during training or competition and improving range of motion (Rahman & Islam, 2020).

Physical fitness enhances recovery after exercise, allowing well-conditioned to optimize training and extend their careers through efficient injury recovery (Malm et al., 2019; Singh et al., 2024). Muscular strength improve shoulder stability and upper-body strength, essential for activities like rock climbing and rowing, and assess relative upper-body strength since pulling muscles are generally weaker (Andrew, 2002; Harman et al., 2008; Negrete et al., 2013). Upper-body power boosts performance by enhancing force-time characteristics, demonstrated in cross-country skiing (Suchomel et al., 2016; Rahman & Sharma, 2023; Sunde et al., 2019). The sit-up test measures core muscular endurance, crucial for sustained performance and reduced fatigue (Bianco et al., 2015; Hughes et al., 2018; Prieto-González & Sedlacek, 2022). Flexibility supports joint range of motion and injury prevention, improved by consistent stretching (Leite et al., 2017). The Nordic hamstring curl is highly effective for improving hamstring flexibility and preventing injuries (Islam et al., 2024). Power training enhances daily functional abilities and quality of life (Balachandran et al., 2022; Miszko et al., 2003). Agility boosts neuromuscular coordination and cognitive health, benefiting both physical and mental fitness (Young et al., 2021; Morat et al., 2020; Lichtenstein et al., 2023). Balance enhances stability, coordination, and reduces fall risk, promoting independence. Reaction time, influenced by age and cognitive skills, is vital for quick responses in sports and daily tasks (Jain et al., 2015; Balakrishnan et al., 2014; Singh & Singh, 2024). BMI, an important health metric, impacts performance and training strategies, with lower BMI often aiding endurance athletes (Eknoyan, 2008; Nuttall, 2015; Blackburn & Jacobs, 2014).

Yoga, an ancient practice originating from India, encompasses physical postures known as asanas, breathing exercises called pranayama, and the skill of meditation (Taneja, 2014). Recognized for its efficacy in addressing lifestyle-related diseases, yoga plays a crucial role in improving overall physical well-being. The research underscores the benefits of regular yoga practice in preventing and managing lifestyle disorders, as highlighted by studies showing its effectiveness in promoting physical fitness and reducing stress, anxiety, and chronic discomfort (Bhavanani, 2017; Desveaux et al., 2015; Woodyard, 2011). Moreover, significant improvements in muscle strength, endurance, and body mass index (BMI) have been documented through yoga practice. For instance, Lau et al. (2015) and Shiraishi and Bezerra (2016) noted enhancements in muscular strength and endurance, while Kumara (2022) specifically reported a remarkable 12.5% increase in muscle strength among participants. Additionally, a recent study demonstrated that a structured six-week yogic practice resulted in a substantial 10.05% improvement in flexibility, further emphasizing yoga's ability to enhance flexibility over a short period (Suseela & Srilakshmidevi, 2017). In conjunction with these benefits, other research highlights notable improvements in power, agility, and balance among individuals who engage in regular yoga practice (Sahu, 2019; Henry, 2022). This is attributed to the mindful movement, breath control, and mental focus inherent in yoga, which positively influences reaction time and overall skill-related fitness. Specifically, studies indicate that yoga can enhance sensory-motor conduction velocity and information processing, leading to a reduction in reaction time (Madanmohan et al., 1992; Madanmohan et al., 2012). Furthermore, yoga has been shown to improve respiratory function, cardiovascular endurance, and overall health, reinforcing its holistic benefits (Pramanik et al., 2024). Importantly, consistent yoga practice has also been associated with reductions in BMI, effective weight management, decreased body fat, and increased muscle mass (Na Nongkhai et al., 2021; Chauhan et al., 2017). Collectively, these findings underscore the profound impact of yoga on various aspects of physical fitness and overall health.

This study aims to explore the effects of regular yogic practice on key fitness parameters – muscular strength, muscular endurance, flexibility, power, agility, balance, reaction time, and BMI – particularly in addressing lifestyle disorders prevalent in young adults due to sedentary behaviour. By examining existing research, the study seeks to demonstrate yoga's effectiveness as an alternative method to traditional fitness programs, offering significant benefits for overall health and well-being. The research highlights the potential of integrating yoga into physical education and training regimens as a core component of fitness protocols, with the potential to redefine training protocols across various disciplines.

Material and Methods

The published articles were located using several search engines, including MEDLINE, EMBASE, Scopus, Science Direct, the Directory of Open Access Journals (DOAJ), PubMed, and Google Scholar. Key search terms included "Yoga," "Muscular Strength," "Muscular Endurance," "flexibility," "power," "agility," "balance," "reaction time," and "BMI," along with the conjunctions "OR" and "AND." All searches were conducted in English, focusing specifically on studies that examine the impact of yogic practices on physical fitness variables for the literature review.

Participants

The study was conducted at the yoga laboratory of the Indira Gandhi Institute of Physical Education and Sports Sciences (IGIPESS), University of Delhi, involving 40 male students aged 18 to 24. These participants, all of whom had normal vision, were randomly assigned to either a control group or an experimental group, with 20 students in each group. In this study, none of the participants smoked, consumed alcohol, had acute or chronic diseases, or were on any medication. Table 1 provides an overview of the participants' characteristics. All participants were examined by a qualified physician and deemed fit to take part in this study. All participants gave their informed consent, confirming their voluntary participation and comprehension of the research procedures.

Table 1. Baseline characteristics of the participants

Parameters	Overall Group (N=40)	Experimental Group (n=20)	Control Group (n=20)
	Mean ± SD	Mean ± SD	Mean ± SD
Age (years)	21.98 ± 0.94	21.53 ± 0.90	22.43 ± 1.01
Height (m)	1.69 ± 0.31	1.68 ± 0.30	1.70 ± 0.34
Weight (kg)	61.26 ± 5.95	59.69 ± 4.90	62.83 ± 5.20
BMI (kg/m^2)	21.45 ± 1.89	21.15± 1.29	21.74± 1.81

Study organization

This research adopted an experimental approach, using a two-group pre-test and post-test design. The aim was to determine if a six-week yogic intervention could significantly improve specific physical fitness parameters. Probability sampling methods were used to select participants from among the students.

Experimental Protocol

Participants in the experimental group followed a structured yoga regimen that featured Yogic Prayer, Suryanamaskar, and numerous Asanas, the program also incorporated Pranayama and included Meditation practices. These sessions took place at the IGIPESS yoga lab at the University of Delhi, from 7:30 to 8:30 am Monday to Saturday, under the supervision of certified yoga instructors. In contrast, the control group adhered to their usual daily routines without additional interventions. To measure the impact, assessments were made for all involved before the intervention began and after its completion at six weeks. Figure 2 provides an overview of this intervention.

Procedure

Muscular strength was assessed using the pull-up test, where participants pulled their chin above a bar from a hanging position with an overhand grip, avoiding jerking or hip movements, and the number of successful pull-ups was recorded as the score (Hurrah & Muzafer, 2017). Muscular endurance was measured using the bent knee sit-up test, with participants performing as many sit-ups as possible in one minute from a supine position, knees bent at 90 degrees,

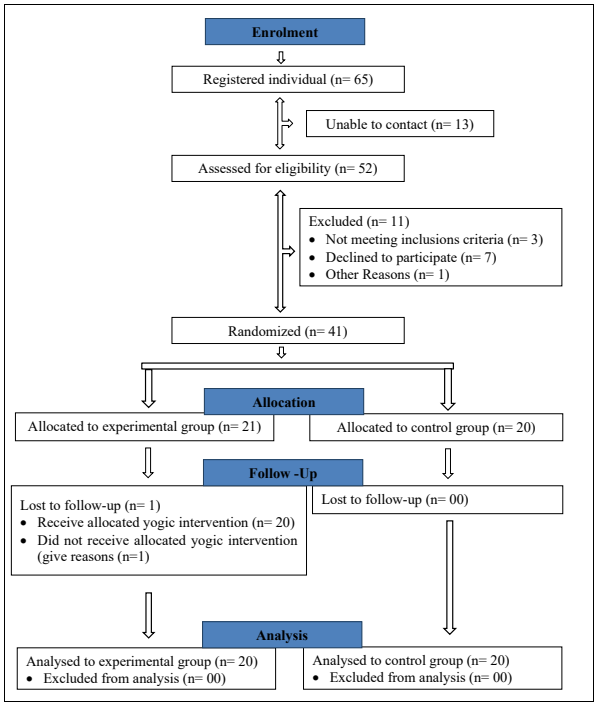

Fig. 1. Participations selection consort flow chart

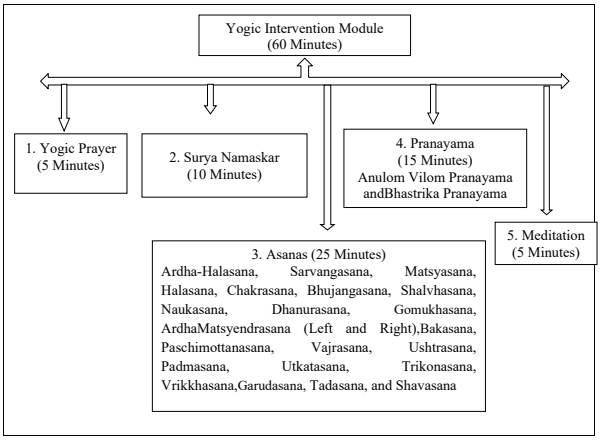

Fig. 2. Yogic intervention module

arms behind the neck, and feet held by a partner, earning one point per correct sit-up (Suman & Sharma, 2023). Flexibility was evaluated with the sit and reach test, where participants, seated with legs extended and feet against a plate, bent forward to push a cursor with their middle fingers, recording the highest of three attempts in centimeters (Luo & Huang, 2023). Power was assessed using the standing broad jump (SBJ), with participants jumping forward from a standing position and measuring the distance to the nearest heel (Thomas et al., 2020). Agility was tested with the shuttle run, running back and forth between two lines 10 meters apart at increasing speeds (Verschuren & Takken, 2010). Balance was measured through the squat handstand, where participants balanced on their hands with knees on their arms and held the position as long as possible for a single attempt. Reaction time was measured in milliseconds using the Medisystems

reaction timer, which had researcher-controlled lights and switches for subjects to turn off the lights quickly (Rahman & Islam, 2021; Reza et al., 2023). BMI was calculated by dividing body weight in kilograms by height in meters squared (Joksimović et al., 2021; Shaw et al., 2021).

Statistical Analysis

For the statistical analysis, the Shapiro-Wilk test verified the normality of data distribution, and Levene's test confirmed the equality of variances; descriptive statistics, including mean and SD, were used, while inferential analysis involved paired t-tests for within-group differences and independent samples t-tests for between-group comparisons, with all analyses conducted using IBM SPSS software (version 25) at a significance level of 0.05.

Results

Table 2 presents the descriptive statistics for the experimental (EG) and control (CG) groups, while Figure 2 illustrates changes in muscular strength, endurance, and BMI from pre-test to post-test, demonstrating the effectiveness in improving physical fitness.

Table 3 presents a paired t-test analysis results, demonstrating significant improvements in several physical fitness parameters within the experimental group (EG) following the intervention. The EG exhibited notable increases in muscular strength, $t_{(19)} = 5.18$, $p = .000$; muscular endurance, $t_{(19)} = 2.78$, $p = .012$; flexibility, $t_{(19)} = 5.15$, $p = .000$; power, $t_{(19)} = 2.51$, $p = .021$; agility, $t_{(19)} = 2.14$, $p = .046$; balance, $t_{(19)} = 2.85$, $p = .010$; and reaction time, $t_{(19)} = 2.35$, $p = .030$. Additionally, BMI significantly reduced

Table 2. Descriptive statistics

Variables	Group	Test	n	Mean	Std. Deviation	Std. Error Mean
Muscular Strength (Number)	EG	Pre-test	20	22.20	3.98	.89
		Post-test	20	23.85	3.56	.80
	CG	Pre-test	20	20.10	4.53	1.01
		Post-test	20	20.40	3.82	.85
Muscular Endurance (Number)	EG	Pre-test	20	36.10	4.48	1.00
		Post-test	20	37.00	4.80	1.07
	CG	Pre-test	20	33.45	6.44	1.44
		Post-test	20	32.65	6.67	1.49
Flexibility (centimetre)	EG	Pre-test	20	18.65	2.28	.51
		Post-test	20	19.60	1.96	.44
	CG	Pre-test	20	18.30	2.47	.55
		Post-test	20	18.50	2.31	.52
Power (meter)	EG	Pre-test	20	1.88	.28	.06
		Post-test	20	1.91	.25	.06
	CG	Pre-test	20	1.96	.10	.02
		Post-test	20	1.94	.10	.02
Agility (second)	EG	Pre-test	20	12.18	.97	.22
		Post-test	20	12.11	.95	.21
	CG	Pre-test	20	11.96	.48	.11
		Post-test	20	12.01	.50	.11
Balance (second)	EG	Pre-test	20	7.60	1.50	.34
		Post-test	20	8.20	1.47	.33
	CG	Pre-test	20	7.05	1.10	.25
		Post-test	20	7.00	.92	.21
Reaction Time (millisecond)	EG	Pre-test	20	15.75	1.02	.23
		Post-test	20	15.45	.95	.21
	CG	Pre-test	20	16.35	1.04	.23
		Post-test	20	16.20	1.06	.24
BMI (kg/m^2)	EG	Pre-test	20	21.15	2.64	.59
		Post-test	20	20.85	2.38	.53
	CG	Pre-test	20	21.92	2.26	.51
		Post-test	20	21.74	2.42	.54

Table 3. Paired t-test 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)
Muscular Strength	EG	Pre-test Post-test	1.65	1.42	.32	5.18	19	.000*
	CG	Pre-test Post-test	.30	2.72	.61	.49	19	.627
Muscular Endurance	EG	Pre-test Post-test	.90	1.45	.32	2.78	19	.012*
	CG	Pre-test Post-test	.80	1.88	.42	1.90	19	.072
Flexibility	EG	Pre-test Post-test	.95	.83	.19	5.15	19	.000*
	CG	Pre-test Post-test	.20	.62	.14	1.45	19	.163
Power	EG	Pre-test Post-test	.03	.06	.01	2.51	19	.021*
	CG	Pre-test Post-test	.01	.04	.01	1.46	19	.159
Agility	EG	Post-test Post-test	.07	.14	.03	2.14	19	.046*
	CG	Pre-test Post-test	.05	.19	.04	1.09	19	.288
Balance	EG	Pre-test Post-test	.60	.94	.21	2.85	19	.010*
	CG	Pre-test Post-test	.05	.83	.19	.27	19	.789
Reaction Time	EG	Pre-test Post-test	.30	.57	.13	2.35	19	.030*
	CG	Pre-test Post-test	.15	.59	.13	1.14	19	.267
BMI	EG	Pre-test Post-test	.30	.42	.09	3.18	19	.005*
	CG	Pre-test Post-test	.19	1.20	.27	.69	19	.498

*Significant at 0.05 level

for the EG, $t_{(19)} = 3.18$, $p = .005$. In contrast, the control group (CG) did not exhibit significant changes in these parameters: muscular strength, $t_{(19)} = .49$, $p = .627$; muscular endurance, $t_{(19)} = 1.90$, $p = .072$; flexibility, $t_{(19)} = 1.45$, $p = .163$; power, $t_{(19)} = 1.46$, $p = .159$; agility, $t_{(19)} = 1.09$, $p = .288$; balance, $t_{(19)} = .27$, $p = .789$; reaction time, $t_{(19)} = 1.14$, $p = .267$; and BMI, $t_{(19)} = .69$, $p = .498$ remained statistically insignificant.

These results strongly suggest that the intervention had a statistically significant impact on the experimental group's (EG) physical fitness outcomes. In contrast, the control groups (CG), which did not receive the intervention, showed no improvements across the same parameters. Consequently, this analysis underscores the efficacy of the intervention in enhancing physical fitness parameters specifically within the experimental group.

The independent t-test results presented in Table 4 show comparisons between the experimental group (EG) and control group (CG) for pre-test and post-test scores across multiple physical fitness variables, including muscular strength, muscular endurance, flexibility, power, agility, balance, reaction time, and BMI. In the pre-test, no significant differences were found between EG and CG in any of the variables. Muscular strength showed $t_{(38)} = 1.56$, $p = .128$; muscular endurance $t_{(38)} = 1.51$, $p = .139$; flexibility $t_{(38)} = .47$, $p = .644$; power $t_{(38)} = 1.19$, $p = .243$; agility $t_{(38)} = .91$, $p = .370$; balance $t_{(38)} = 1.32$, $p = .194$; reaction time $t_{(38)} = 1.84$, $p = .073$; and BMI $t_{(38)} = .99$, $p = .328$. However, in the post-test, several variables showed significant differences favoring the experimental group. Muscular

Table 4. Independent t-test of pre-test and post-test between experimental and control groups

Variables	Independent t-test between EG and CG of pre-test				Independent t-test between EG and CG of post-test			
	Mean Difference	t	df	Sig. (2-tailed)	Mean Difference	t	df	Sig. (2-tailed)
Muscular Strength	2.10	1.56	38	.128	3.45	2.96	38	.005*
Muscular Endurance	2.65	1.51	38	.139	4.35	2.37	38	.023*
Flexibility	.35	.47	38	.644	1.10	1.63	38	.112
Power	.08	1.19	38	.243	.04	.61	38	.549
Agility	.22	.91	38	.370	.11	.45	38	.652
Balance	.55	1.32	38	.194	1.20	3.09	38	.004*
Reaction Time	.60	1.84	38	.073	.75	2.37	38	.023*
BMI	.77	.99	38	.328	.89	1.17	38	.251

*Significant at 0.05 level

strength increased significantly in EG compared to CG with $t_{(38)} = 2.96$, $p = .005$, as did muscular endurance $t_{(38)} = 2.37$, $p = .023$, and balance $t_{(38)} = 3.09$, $p = .004$, and reaction time, $t_{(38)} = 2.37$, $p = .023$. No significant post-test differences were found for flexibility $t_{(38)} = 1.63$, $p = .112$, power $t_{(38)} = .61$, $p = .549$, agility $t_{(38)} = .45$, $p = .652$, and BMI $t(38) = 1.17$, $p = .251$.

These findings suggest that the experimental intervention led to significant improvements in muscular strength, endurance, balance, and reaction time in the experimental group, while other physical variables did not differ significantly between groups post-intervention.

Discussions

The results in Table 3 demonstrate significant improvements in muscular strength following the yoga intervention, particularly within the experimental group (EG) during both the pre-test and post-test stages. These findings align with a growing body of research that underscores yoga's effectiveness in enhancing muscular strength and overall physical fitness. For example, yogic practices can significantly enhance muscular strength, particularly in the upper body and core muscles, due to the intensity levels achieved through specific yoga postures (Lau et al., 2015). Moderate benefits of yoga practice on muscle strength, balance, mobility, and flexibility have also been observed (Shin, 2021). Additionally, yoga poses typically engage multiple muscle groups, contributing to overall strength gains (Sivaramakrishnan et al., 2019). Significant increases in muscular strength and endurance were noted following an 8-week yoga program for players, emphasizing yoga's utility in improving muscular capabilities across different populations (Singh et al., 2015). Furthermore, yoga's emphasis on alignment and posture plays a crucial role in optimizing muscular engagement and strength efficiency (Woodyard, 2011).

Building on these findings, the current study suggests that the yoga intervention led to significant improvements in muscular endurance for the EG compared to the CG. These findings align with earlier research on yoga's effects on muscular endurance. A 6-week yoga program notably enhanced upper limb and abdominal muscular endurance in young women (Shiraishi & Bezerra, 2016), and a 12-week yoga intervention improved abdominal endurance in young, healthy participants (Shiraishi et al., 2017). Consistent yoga practice over several weeks resulted in significant increases in both muscular endurance and flexibility, further supporting the link between yoga and physical fitness (Kame, 2018). Additionally, a 12-week yoga program significantly improved muscular endurance among working women in the textile industry, with gains linked to the regular practice of yoga asanas and Surya Namaskara (Kumar & Madaan, 2024).

Moreover, consistent research has demonstrated the positive effects of yoga interventions on flexibility among college students. Luo and Huang (2023) reported a significant improvement in flexibility, as measured by the sit and reach test, with p-values indicating statistical significance ($p < 0.05$). Similarly, Raja and Balaji (2024) found that participants in an experimental group engaging in yoga exhibited notable enhancements in flexibility compared to a control group. Further supporting these findings, Polsgrove et al. (2016) noted that students who participated in a structured yoga program showed significant improvements in flexibility over those who did not engage in yoga, suggesting that the dynamic and structured elements of yoga training are more effective for enhancing flexibility than traditional warm-up routines. Collectively, these studies highlight the efficacy of yoga as a beneficial practice for improving flexibility among college students.

Additionally, Studies have highlighted yoga's effectiveness in enhancing muscle power, with participants showing significant improvements after just six weeks of practice. For instance, Ghosh et al. (2023) observed substantial gains in muscle power, while Singh et al. (2021) found that even brief yogic interventions can produce measurable results. Similarly, Wankhade (2020) reported marked improvements in explosive power among college students, and Sandhyarani & Shenbagavalli (2014) noted significant gains in an experimental group practicing yoga, contrasting with a control group that showed no notable change.

In terms of agility, the current study indicated that participants who engaged in a yogic practice intervention experienced significant improvements in agility compared to a control group, with results showing statistical significance at the 0.05 level, highlighting that traditional training alone did not produce similar benefits (Singh, 2019). Similarly, another study found that practicing yogic techniques like asanas and pranayama led to significant agility improvements,

reinforcing yoga's potential to enhance physical fitness for both athletes and younger individuals (Sharma, 2019). Furthermore, an additional study revealed that a several-week yoga program could significantly enhance agility across various groups, including college students and general fitness enthusiasts.

In relation to balance, a study of a yoga intervention revealed that participants practicing yogasana showed significant improvements, suggesting that consistent yoga practice can lead to measurable enhancements in this area (Bhowmik & Ray, 2024). This finding is further supported by a systematic review and meta-analysis, which demonstrated significant improvements in balance from yoga interventions compared to inactive controls, while those engaged in alternative physical activities or no interventions did not experience similar benefits (Sivaramakrishnan et al., 2019).

Moreover, the results shown in Table 3 indicate a notable difference in visual reaction time (VRT) between the experimental and control groups. This observation aligns with prior studies, such as one by Madanmohan et al. (1992), which found that yoga practices significantly enhance reaction time. Furthermore, a meta-analysis by Ghuntla and Dholakiya (2023) supports this by confirming the beneficial effects of yoga on reaction time across various populations. Additionally, other research has indicated that short-term yoga training can effectively decrease baseline visual reaction times in healthy individuals (Begum et al., 2012). Interestingly, another study revealed that hand quickness in simple visual reaction tasks was comparable between university athletes and sedentary students (Rahman et al., 2020), suggesting that the benefits of yoga may extend beyond traditional athletic training. The observed reduction in VRT within the yoga group further suggests an improvement in sensorimotor skills and a greater processing capacity of the central nervous system among yoga practitioners, as indicated by Shobana et al. (2021). Physiologically, this improvement is evident in the time it takes for stimuli to reach the brain, which typically ranges between 20-40 ms for visual stimuli (Kemp, 1973; Marshall et al., 1943). Overall, these findings illustrate that yoga not only positively influences reaction time but also enhances sensorimotor skills and improves central nervous system processing capacity as a result of regular practice.

Finally, the findings from the current study align with the growing body of research supporting yoga as an effective intervention for reducing BMI and improving overall body composition. A systematic review and meta-analysis demonstrated that yoga is a safe and beneficial approach for addressing weight-related outcomes, particularly in individuals who are overweight or obese and highlighted yoga's potential as a complementary strategy to traditional weight management methods (Lauche et al., 2016). Consistent yoga practice over 8 to 12 weeks resulted in notable reductions in both BMI and body fat mass, which aligns with the current study's findings of significant improvements in body composition through regular yoga practice (Na Nongkhai et al., 2021). Decreases in BMI and other anthropometric measures were observed after a 1-month yoga program in obese individuals, reinforcing yoga's efficacy in managing obesity (Kumari et al., 2011). Yoga also significantly alleviated symptoms of anxiety and depression in overweight and obese individuals, alongside improvements in obesity, without dietary changes (Dhananjai et al., 2013). Consistent with these findings, the current study revealed a significant reduction in BMI (from 26.4 ± 2.5 to 25.22 ± 2.4) in the EC, with no changes seen in the CG, suggesting that yoga can effectively regulate BMI without requiring pharmacological intervention (Chauhan et al., 2017). Potential mechanisms, through which yoga might reduce BMI, such as increased energy expenditure during practice, add another dimension to understanding how yoga contributes to overall body composition improvements (Batrakoulis, 2022).

In summary, this study's findings align with existing literature demonstrating yoga's positive impact on muscle strength, muscle endurance, flexibility, power, agility, balance, reaction time, and BMI, further supporting its role as a holistic intervention for physical and mental well-being.

Conclusions

Based on the results, the experimental intervention is a robust method for improving key fitness parameters—muscular strength, muscular endurance, flexibility, power, agility, balance, reaction time, and BMI. The significant improvements observed in the experimental group, but not in the control group, confirm that these gains were due to the intervention itself. These findings highlight the intervention's potential utility in programs aimed at comprehensively enhancing physical fitness, offering both performance-related and health-related benefits. Future studies could investigate the long-term sustainability of these improvements and whether further enhancements could be achieved with extended or modified versions of the intervention.

Acknowledgment

The authors would like to express their sincere gratitude to all of the wonderful volunteers whose contributions has greatly enhanced the research.

Conflict of Interest

The authors declare no conflicts of interest.

References

Sahu, S., Kumar, S., Nagtode, N. R., & Sahu, M. (2024). The burden of lifestyle diseases and their impact on health service in India—A narrative review. *Journal of Family Medicine and Primary Care, 13*(5), 1612-1619. https://doi.org/10.4103/jfmpc.jfmpc_693_23

Bhavanani, A. B. (2017). Role of yoga in prevention and management of lifestyle disorders. *Yoga Mimamsa, 49*(2), 42-47. https://doi.org/10.4103/ym.ym_14_17

Zhu, X., Haegele, J. A., Liu, H., & Yu, F. (2021). Academic Stress, Physical Activity, Sleep, and Mental Health among Chinese Adolescents. *International Journal of Environmental Research and Public Health, 18*(14), 7257. https://doi.org/10.3390/ijerph18147257

Neil-Sztramko, S. E., Caldwell, H., & Dobbins, M. (2021). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *The Cochrane Database of Systematic Reviews, 9*(9), CD007651. https://doi.org/10.1002/14651858.CD007651.pub3

Kljajević, V., Stanković, M., Đorđević, D., Trkulja-Petković, D., Jovanović, R., Plazibat, K., Oršolić, M., Čurić, M., & Sporiš, G. (2021). Physical activity and physical fitness among university students-a systematic review. *International Journal of Environmental Research and Public Health, 19*(1), 158. https://doi.org/10.3390/ijerph19010158

Reza, M. N., Rahman, M. H., Islam, M. S., Mola, D. W., & Andrabi, S. M. H. (2024). Assessment of motor fitness metrics among athletes in different sports: An original research. *Physical Education Theory and Methodology, 24*(1), 47-55. https://doi.org/10.17309/tmfv.2024.1.06

Berduszek, R. J., Geerdink, H., van der Sluis, C. K., Reneman, M. F., & Dekker, R. (2021). Health-related physical fitness in patients with complaints of hand, wrist, forearm and elbow: An exploratory study. *BMJ Open Sport & Exercise Medicine, 7*(4), e001148. https://doi.org/10.1136/bmjsem-2021-001148

Rahman, M. H., & Islam, M. S. (2020). Stretching and flexibility: A range of motion for games and sports. European *Journal of Physical Education and Sport Science, 6*(8), 22-36. https://doi.org/10.46827/ejpe.v6i8.3380

Malm, C., Jakobsson, J., & Isaksson, A. (2019). Physical activity and sports-real health benefits: A review with insight into the public health of Sweden. *Sports (Basel, Switzerland), 7*(5), 127. https://doi.org/10.3390/sports7050127

Singh, L. S., Singh, W. J., Azeem, K., Meitei, N. M., & Mola, D. W. (2024). Concept of plyometric training and its effect on physiological parameters of football players. *Physical Education Theory and Methodology, 24*(4), 609-618. https://doi.org/10.17309/tmfv.2024.4.13

Andrew T. L. (2002). Closed Kinetic Chain Exercise. A Comprehensive Guide to Multiple-Joint Exercises. *Journal of Chiropractic Medicine, 1*(4), 200. https://doi.org/10.1016/S0899-3467(07)60039-1

Harman, E. A., Gutekunst, D. J., Frykman, P. N., Nindl, B. C., Alemany, J. A., Mello, R. P., & Sharp, M. A. (2008). Effects of two different eight-week training programs on military physical performance.*Journal of Strength and Conditioning Research, 22*(2), 524-534. https://doi.org/10.1519/JSC.0b013e31816347b6

Negrete, R. J., Hanney, W. J., Pabian, P., & Kolber, M. J. (2013). Upper body push and pull strength ratio in recreationally active adults. *International Journal of Sports Physical Therapy, 8*(2), 138-144.

Suchomel, T. J., Nimphius, S., & Stone, M. H. (2016). The Importance of Muscular Strength in Athletic Performance. *Sports Medicine (Auckland, N.Z.), 46*(10), 1419-1449. https://doi.org/10.1007/s40279-016-0486-0

Rahman, M. H., & Sharma, J. P. (2023). An assessment of maximal isometric hand grip strength and upper body explosive strength and endurance in various ball sports. *Physical Education Theory and Methodology, 23*(6), 932–939. https://doi.org/10.17309/tmfv.2023.6.16

Sunde, A., Johansen, J. M., Gjøra, M., Paulsen, G., Bråten, M., Helgerud, J., & Støren, Ø. (2019). Stronger is better: The impact of upper body strength in double poling performance. *Frontiers in Physiology,* 10, 1091. https://doi.org/10.3389/fphys.2019.01091

Bianco, A., Lupo, C., Alesi, M., Spina, S., Raccuglia, M., Thomas, E., Paoli, A., & Palma, A. (2015). The sit up test to exhaustion as a test for muscular endurance evaluation. *SpringerPlus,* 4, 309. https://doi.org/10.1186/s40064-015-1023-6

Hughes, D. C., Ellefsen, S., & Baar, K. (2018). Adaptations to endurance and strength training. *Cold Spring Harbor perspectives in medicine, 8*(6), a029769. https://doi.org/10.1101/cshperspect.a029769

Prieto-González, P., & Sedlacek, J. (2022). Effects of running-specific strength training, endurance training, and concurrent training on recreational endurance athletes' performance and selected anthropometric parameters. *International Journal of Environmental Research and Public Health, 19*(17), 10773. https://doi.org/10.3390/ijerph191710773

Leite, T. B., Costa, P. B., Leite, R. D., Novaes, J. S., Fleck, S. J., & Simão, R. (2017). Effects of Different Number of Sets of Resistance Training on Flexibility. *International journal of exercise science, 10*(3), 354-364.

Islam, M. S., Rahman, M. H., Mola, D. W., Adane, A. K., & Pramanik, T. N. (2024). Nordic hamstring curls are a remedy for hamstring muscle injury: A narrative review. *International Journal of Human Movement and Sports Sciences, 12*(4), 692-698. https://doi.org/10.13189/saj.2024.120411

Balachandran, A. T., Steele, J., Angielczyk, D., Belio, M., Schoenfeld, B. J., Quiles, N., Askin, N., & Abou-Setta, A. M. (2022). Comparison of Power Training vs Traditional Strength Training on Physical Function in Older Adults: A Systematic Review and Meta-analysis. *JAMA network open, 5*(5), e2211623. https://doi.org/10.1001/jamanetworkopen.2022.11623

Miszko, T. A., Cress, M. E., Slade, J. M., Covey, C. J., Agrawal, S. K., & Doerr, C. E. (2003). Effect of strength and power training on physical function in community-dwelling older adults. *The Journals of Gerontology: Series A, 58*(2), 171–175. https://doi.org/10.1093/gerona/58.2.M171

Young, W., Rayner, R., & Talpey, S. (2021). It's Time to Change Direction on Agility Research: a Call to Action. *Sports medicine - open, 7*(1), 12. https://doi.org/10.1186/s40798-021-00304-y

Morat, M., Faude, O., Hanssen, H., Ludyga, S., Zacher, J., Eibl, A., Albracht, K., & Donath, L. (2020). Agility Training to Integratively Promote Neuromuscular, Cognitive, Cardiovascular and Psychosocial Function in Healthy Older Adults: A Study Protocol of a One-Year Randomized-Controlled Trial. *International journal of environmental research and public health, 17*(6), 1853. https://doi.org/10.3390/ijerph17061853

Lichtenstein, E., Held, S., Rappelt, L., Zacher, J., Eibl, A., Ludyga, S., Faude, O., & Donath, L. (2023). Agility training to integratively promote neuromuscular, cardiorespiratory and cognitive function in healthy older adults: a one-year randomized-controlled trial. *European review of aging and physical activity: official journal of the European Group for Research into Elderly and Physical Activity, 20*(1), 21. https://doi.org/10.1186/s11556-023-00331-6

Jain, A., Bansal, R., Kumar, A., & Singh, K. D. (2015). A comparative study of visual and auditory reaction times on the basis of gender and physical activity levels of medical first year students. *International Journal of Applied and Basic Medical Research, 5*(2), 124-127. https://doi.org/10.4103/2229-516X.157168

Balakrishnan, G., Uppinakudru, G., Girwar Singh, G., Bangera, S., DuttRaghavendra, A., & Thangavel, D. (2014). A comparative study on visual choice reaction time for different colors in females. *Neurology Research*

International, 2014, 301473. https://doi.org/10.1155/2014/301473

Singh, L. T., & Singh, T. S. (2024). Comparative investigation of hand and foot reaction ability between the basketball and handball players. *Sport Sciences for Health,* 1-6. https://doi.org/10.1007/s11332-023-01154-9

Eknoyan G. (2008). Adolphe Quetelet (1796-1874) – the average man and indices of obesity. *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association, 23*(1), 47-51. https://doi.org/10.1093/ndt/gfm517

Nuttall F. Q. (2015). Body mass index: Obesity, BMI, and health: A critical review. *Nutrition Today, 50*(3), 117-128. https://doi.org/10.1097/NT.0000000000000092

Blackburn, H., & Jacobs, D., Jr (2014). Commentary: Origins and evolution of body mass index (BMI): Continuing saga. *International Journal of Epidemiology, 43*(3), 665-669. https://doi.org/10.1093/ije/dyu061

Taneja, D. K. (2014). Yoga and health. *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine, 39*(2), 68-72. https://doi.org/10.4103/0970-0218.132716

Desveaux, L., Lee, A., Goldstein, R., & Brooks, D. (2015). Yoga in the management of chronic disease: A systematic review and meta-analysis. *Medical Care, 53*(7), 653-661. https://doi.org/10.1097/MLR.0000000000000372

Woodyard C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga, 4*(2), 49-54. https://doi.org/10.4103/0973-6131.85485

Lau, C., Yu, R., & Woo, J. (2015). Effects of a 12-week hatha yoga intervention on cardiorespiratory endurance, muscular strength and endurance, and flexibility in Hong Kong Chinese adults: A controlled clinical trial. *Evidence-based Complementary and Alternative Medicine,* 2015, 958727. https://doi.org/10.1155/2015/958727

Shiraishi, J. C., & Bezerra, L. M. (2016). Effects of yoga practice on muscular endurance in young women. *Complementary Therapies in Clinical Practice,* 22, 69-73. https://doi.org/10.1016/j.ctcp.2015.12.007

Kumara, G. (2022). The effectiveness of yoga exercise on muscle strength in the elderly. *International Journal of Multidisciplinary Research and Analysis, 5*(8), 2229-2233. https://doi.org/10.47191/ijmra/v5-i8-41

Suseela, V., & Srilakshmidevi, B. (2017). Effect of yogic practices on flexibility among annamalai university students. *International Journal of Research - GRANTHAALAYAH, 5*(7), 63-67. https://doi.org/10.29121/granthaalayah.v5.i7(se).2017.2124

Sahu, D. P. (2019). Effect of yogic practice on selected motor fitness components of college students. International *Journal of Physiology, Nutrition and Physical Education, 4*(1), 2094-2100.

Henry, C. M. (2022). The effect of yoga asanas on selected physiological and motor fitness variables of engineering students. *International Journal of Novel Research and Development, 7*(8), 1469-1478.

Madanmohan, Thombre, D. P., Balakumar, B., Nambinarayanan, T. K., Thakur, S., Krishnamurthy, N., & Chandrabose, A. (1992). Effect of yoga training on reaction time, respiratory endurance and muscle strength. *Indian Journal of Physiology and Pharmacology, 36*(4), 229-233

Madanmohan, Bhavanani, A. B., Dayanidy, G., Sanjay, Z., &Basavaraddi, I. V. (2012). Effect of yoga therapy on reaction time, biochemical parameters and wellness score of peri and post-menopausal diabetic patients. *International Journal of Yoga, 5*(1), 10-15. https://doi.org/10.4103/0973-6131.91696

Pramanik, T. N., Rahaman, A., Rahman, M. H., Shukla, A., & Pradhan, P. (2024). Enhancing respiratory function and cardiovascular endurance through intensive yogic intervention: A comprehensive study. *Physical Education Theory and Methodology, 24*(3), 449–457. https://doi.org/10.17309/tmfv.2024.3.14

Na Nongkhai, M. P., Yamprasert, R., & Punsawad, C. (2021). Effects of continuous yoga on body composition in obese adolescents. *Evidence-Based Complementary and Alternative Medicine,* 2021, 1-7. https://doi.org/10.1155/2021/6702767

Chauhan, A., Semwal, D. K., Mishra, S. P., & Semwal, R. B. (2017). Yoga practice improves the body mass index and blood pressure: A randomized controlled trial. *International Journal of Yoga, 10*(2), 103-106. https://doi.org/10.4103/ijoy.IJOY_46_16

Hurrah, K. A., & Muzafer, M. (2017). Muscular strength between individual and team game players: A comparative study. International Journal of Physiology, Nutrition and Physical Education, 2(2), 148-149.

Suman, & Sharma, A. K. (2023). Study of physical fitness level of north and south Indian hockey players. *Elementary Education Online, 19*(1), 1023-1029. https://ilkogretim-online.org/index.php/pub/article/view/7279

Luo, X., & Huang, X. (2023). The effects of a yoga intervention on balance and flexibility in female college students during COVID-19: A randomized controlled trial. *PLoS ONE, 18*(3), e0282260. https://doi.org/10.1371/journal.pone.0282260

Thomas, E., Petrigna, L., Tabacchi, G., Teixeira, E., Pajaujiene, S., Sturm, D. J., Sahin, F. N., Gómez-López, M., Pausic, J., Paoli, A., Alesi, M., & Bianco, A. (2020). Percentile values of the standing broad jump in children and adolescents aged 6-18 years old. *European Journal of Translational Myology, 30*(2), 240-246. https://doi.org/10.4081/ejtm.2019.9050

Verschuren, O., & Takken, T. (2010). 10-metre shuttle run test. *Journal of Physiotherapy, 56*(2), 136. https://doi.org/10.1016/S1836-9553(10)70046-1

Rahman, M. H., & Islam, M. S. (2021). Investigation of audio-visual simple reaction time of university athletes and non-athletes. *Journal of Advances in Sports and Physical Education, 4*(3), 24-29. https://doi.org/10.36348/jaspe.2021.v04i03.002

Reza, M. N., Rahman, M. H., Islam, M. S., & Gayen, A. (2023). An examination of audio-visual simple reaction times in selected court games. *Australian Journal of Basic and Applied Sciences, 17*(1), 9-14. https://doi.org/10.22587/ajbas.2023.17.1.2

Joksimović, M., Kukrić, A., Nikšić, E., D'Angelo, S., Злојутро, H., & Skrypchenko, I. (2021). Body height, body mass, body mass index of elite basketball players in relation to the playing position and their importance for success in the game. *Acta Kinesiologica, 15*(2), 74-79. https://doi.org/10.51371/issn.1840-2976.2021.15.2.9

Shaw, B. S., Turner, S., & Shaw, I. (2021). Comparison of muscular endurance and hypertrophy resistance training on cardiovascular disease risk in sedentary male smokers.

Asian Journal of Sports Medicine, 12(2), e106589. https://doi.org/10.5812/asjsm.106589

Shin, S. (2021). Meta-analysis of the effect of yoga practice on physical fitness in the elderly. *International Journal of Environmental Research and Public Health, 18*(21), 11663. https://doi.org/10.3390/ijerph182111663

Sivaramakrishnan, D., Fitzsimons, C., Kelly, P., Ludwig, K., Mutrie, N., Saunders, D. H., & Baker, G. (2019). The effects of yoga compared to active and inactive controls on physical function and health related quality of life in older adults- systematic review and meta-analysis of randomised controlled trials. *The International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 33. https://doi.org/10.1186/s12966-019-0789-2

Singh, T., Singh, A., & Kumar, S. (2015). Effects of 8-week yoga on muscular strength, muscular endurance, flexibility, and agility of female hockey players. *Research Journal of Social Science & Management, 5*(7), 97-99.

Shiraishi, J. C., Gadelha, A. B., Bezerra, L. M., & Porto, L. G. (2017). Effects of a 12-Week systematized yoga intervention on health-related physical fitness in healthy adults. *Advances in Physical Education, 7*(1), 27-37. https://doi.org/10.4236/ape.2017.71003

Kame, S. T. (2018). Effect of yoga practices on muscular endurance and flexibility of young adult girls. *Res. J. Recent Sci, 7*(11), 21-23.

Kumar, M., & Madaan, V. (2024). Yoga's impact on muscular endurance and flexibility: A study on working women in the textile industry. *International Journal of Creative Research Thoughts (IJCRT), 12*(1), 307-310.

Raja, S. C., & Balaji, P. (2024). Impact of selected yoga practices on balance and flexibility among geriatric population. *Journal of Advanced Sports and Physical Education, 7*(5), 91-98.

Polsgrove, M. J., Eggleston, B. M., & Lockyer, R. J. (2016). Impact of 10 weeks of yoga practice on flexibility and balance of college athletes. *International Journal of Yoga, 9*(1), 27-34. https://doi.org/10.4103/0973-6131.171710

Ghosh, M., Mondal, S., & Nandi, S. C. (2023). Effects of yogic practices and walking on leg explosive strength among school boys. *Online International Interdisciplinary Research Journal, 13*(3), 72-78.

Singh, V., Acharya, J., & Bhutia, T. N. (2021). Effect of 6 weeks of online vinyasa training on explosive leg strength of school children during COVID-19 – A pilot study. *Journal of Physical Education and Sport, 21*(4), 2276-2282. https://doi.org/10.7752/jpes.2021.s4304

Wankhade, V. R. (2020). Effect of yogic training on low level physical fitness of collegiate girls. I*nternational Journal of Physiology, Nutrition and Physical Education, 5*(1), 151-154.

Sandhyarani, P. S., & Shenbagavalli, A. (2014). Effect of Selected Yogic Practices on Physical Variables among College Women Students. *Research Journal of Physical Education Sciences, 2*(9), 1-4.

Singh, A. (2019). The effect of selected yogic practices upon flexibility and agility of soccer players. *International Journal of Yogic, Human Movement and Sports Sciences, 4*(2), 181-183.

Sharma, N. (2019). Effect of yogic practices on agility among secondary school students. *International Journal of Yogic, Human Movement and Sports Sciences, 4*(1), 1200-1202.

Bhowmik, B. G., & Ray, U. S. (2024). Improvement in muscular strength, body flexibility and balance by yogasana and with reduced detraining effects by yoga breathing maneuvers: A non-randomized controlled study. *Journal of Ayurveda and Integrative Medicine, 15*(1), 100815. https://doi.org/10.1016/j.jaim.2023.100815

Sivaramakrishnan, D., Fitzsimons, C., Kelly, P., et al. (2019). The effects of yoga compared to active and inactive controls on physical function and health-related quality of life in older adults: A systematic review and meta-analysis of randomized controlled trials. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 33. https://doi.org/10.1186/s12966-019-0789-2

Madanmohan, Thombre, D. P., Balakumar, B., Nambinarayanan, T. K., Thakur, S., Krishnamurthy, N., & Chandrabose, A. (1992). Effect of yoga training on reaction time, respiratory endurance and muscle strength. *Indian Journal of Physiology and Pharmacology, 36*(4), 229-233

Ghuntla, T. P., & Dholakiya, J. R. (2023). A meta-analysis of influence of yoga activities on reaction time as a component of skill related fitness. *Health Promotion & Physical Activity, 24*(3), 50-55. https://doi.org/10.55225/hppa.535

Begum, N., Kumaran, S., Venkatesh, G., & Kulkarni, S. B. (2012). Study of the utility of short course of yoga to improve reaction time. *Journal of Clinical and Diagnostic Research, 6*(7), 1241-1243

Rahman, M. H., Chanda, S., & Reza, M. N. (2020). Comparison of simple choice visual reaction time between athlete and sedentary university women students. *European Journal of Physical Education and Sport Science, 6*(4), 1-8. https://doi.org/10.46827/ejpe.v0i0.3045

Shobana, R., Maheshkumar, K., Bagavad Geetha, M., Padmavathi, R., & Venkateswaran, S. T. (2021). Effect of yoga training on the visual and auditoryreaction time in young adults – A pilot study. *International Journal of Current Research and Review 13*(14), 166-169. https://doi.org/10.31782/IJCRR.2021.131403

Kemp, B. J. (1973). Reaction time of young and elderly subjects in relation to perceptual deprivation and signal-on versus signal-off condition. *Developmental Psychology, 8*(2), 268-272. https://doi.org/10.1037/h0034147

Marshall, W. H., Talbot, S. A., & Ades, H. W. (1943). Cortical response of the anesthetized cat to gross photic and electrical afferent stimulation. *Journal of Neurophysiology, 6*(1), 1-15. https://doi.org/10.1152/jn.1943.6.1.1

Lauche, R., Langhorst, J., Lee, M. S., Dobos, G., & Cramer, H. (2016). A systematic review and meta-analysis on the effects of yoga on weight-related outcomes. *Preventive Medicine,* 87, 213-232. https://doi.org/10.1016/j.ypmed.2016.03.013

Kumari, S. N., Gowda, D. K., Sukesh, N., Madhu, L. N., & Kathyayani. (2011). Effect of yoga therapy on body mass index and oxidative status. *Nitte University Journal of Health Science, 1*(1-3), 10-14. https://doi.org/10.1055/s-0040-1703512

Dhananjai, S., Sadashiv, Tiwari, S., Dutt, K., & Kumar, R. (2013). Reducing psychological distress and obesity through yoga practice. *International Journal of Yoga, 6*(1), 66-70. https://doi.org/10.4103/0973-6131.105949

Batrakoulis A. (2022). Psychophysiological adaptations to yoga practice in overweight and obese individuals: A topical review. *Diseases (Basel, Switzerland), 10*(4), 107. https://doi.org/10.3390/diseases10040107

Йогічні практики як допоміжний підхід до розвитку фізичної підготовленості: Інтервенційне дослідження

Тарак Натх Праманік[1ABCDE], Амінур Рахаман[1ABCDE], Гопал Чандра Саха[2ABCDE], Анупам Рой[3ABCDE], Пунам Прадхан[1ABCDE]

[1]Делійський університет
[2]Університет Вішва-Бхараті
[3]Університет Кальяні

Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 11 с., 4 табл., 2 рис., 82 джерела.

Історія питання. Йога є давньою практикою, яка привертає увагу своїми потенційними перевагами з точки зору впливу на розвиток м'язової сили та витривалості, гнучкості, сили, спритності, рівноваги, часу реакції та індексу маси тіла (ІМТ), що дає змогу використовувати цю методику як ефективний допоміжний підхід щодо покращення загального стану здоров'я та фізичної підготовленості.

Мета дослідження. Мета цього дослідження полягала в оцінці впливу шеститижневого режиму занять йогою на загальний стан здоров'я та фізичну підготовленість студентів університету чоловічої статі.

Матеріали та методи. У дослідженні взяли участь 40 студентів-чоловіків віком від 18 до 24 років з Делійського університету, яких було розподілено за методом рандомізації до експериментальної та контрольної груп, кожна з яких складалася з 20 учасників. Експериментальна група проходила шеститижневий курс занять йогою, що включав асани, пранаяму та медитацію, які проводилися щодня під керівництвом сертифікованих інструкторів. Контрольна група продовжувала виконувати свої звичні щоденні процедури. На перед- і постінтервенційному етапах дослідження проведено оцінку показників м'язової сили, м'язової витривалості, гнучкості, потужності, спритності, рівноваги, часу реакції та індексу маси тіла (ІМТ). З метою аналізу даних застосовували як описову статистику, так і інференційну статистику (t-критерії для парних і незалежних вибірок) із використанням програмного забезпечення SPSS (версія 25), з рівнем значущості $\alpha = 0,05$.

Результати. В експериментальній групі спостерігалося значне покращення показників м'язової сили, м'язової витривалості, гнучкості, сили, спритності, рівноваги, часу реакції та індексу маси тіла ($p < 0,005$). Натомість у контрольній групі не було виявлено жодних значущих змін у вищевказаних параметрах. Порівняльний аналіз на передтестовому етапі не показав суттєвих відмінностей між експериментальною та контрольною групами за жодною зі змінних. Однак проведення післятестового порівняльного аналізу між групами продемонстрували суттєві відмінності в кількох ключових аспектах: м'язова сила, м'язова витривалість, рівновага та час реакції ($p < 0,005$). З іншого боку, не спостерігалося достовірних відмінностей у показниках гнучкості, сили, спритності та індексу маси тіла ($p > 0,005$).

Висновки. Шеститижнева інтервенція із практики йоги сприяє ефективному підвищенню показників м'язової сили, м'язової витривалості, гнучкості, потужності, спритності, рівноваги та часу реакції, а також зменшенню індексу маси тіла у студентів університету. Включення йоги до програм фізичного виховання та індивідуальних тренувань має потенціал для значного поліпшення результатів фізичної підготовки серед різних груп населення.

Ключові слова: йогічна практика, м'язова сила, м'язова витривалість, студент університету, фізична підготовленість.

Information about the authors:

Pramanik, Tarak Nath: dr.taraknath@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.

Saha, Gopal Chandra: gopalchandra.saha@visva-bharati.ac.in; https://orcid.org/0000-0001-6813-4484; Department of Physical Education and Sport Science, Visva-Bharati University, Santiniketan, Bolpur, West Bengal 731235, India.

Roy, Anupam: cr7aroy@gmail.com; https://orcid.org/0009-0001-6480-6789; Prabharani Institute of Education, University of Kalyani, Kalyani, Nadia, West Bengal, 711202, 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.

Cite this article as: Pramanik, T. N., Rahaman, A., Saha, G. C., Roy, A., & Pradhan, P. (2025). Yogic Practices as a Complementary Approach to Physical Fitness: An Intervention Study. *Physical Education Theory and Methodology, 25*(1), 109-119. https://doi.org/10.17309/tmfv.2025.1.14

Received: 03.11.2024. Accepted: 16.12.2024. Published: 30.01.2025