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Effects of Structured Yoga Practice on Dietary Habits, Physical Activity, and Health Indices in Undergraduate Students

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Abstract:

Background

The incorporation of yoga into higher education is gaining prominence due to its potential to promote both physical health and psychological well-being. This study aimed to evaluate the impact of a 12-week structured yoga program on anthropometric and physiological indicators, dietary patterns, levels of physical activity, and yoga-related knowledge, attitudes, and practices (KAP) among undergraduate students.

Methods

A randomized controlled trial was conducted involving 178 undergraduate students, who were equally allocated to an intervention group (n = 89) and a wait-list control group (n = 89). Standardized and validated instruments were employed to assess anthropometric measurements, dietary behaviours, physical activity levels, and KAP at baseline and after the intervention.

Results

Participants in the intervention group exhibited significant improvements in dietary behaviour, notably a reduction in the consumption of processed foods (from 39.3% to 13.4%, $p < 0.001$) and an increase in the intake of fresh foods ($p < 0.001$). Physical activity patterns also improved, with a shift towards moderate to vigorous activity levels ($p = 0.002$). Statistically significant enhancements were noted in health information sources ($p = 0.007$), yoga-related knowledge ($p < 0.001$), and the perceived academic benefits of yoga practice ($p < 0.001$). Interest in continuing yoga practice rose markedly from 32.6% to 92.1% ($p < 0.001$). Physiological assessments indicated significant reductions in BMI ($p = 0.019$), resting heart rate ($p = 0.005$), and both systolic ($p = 0.018$) and diastolic blood pressure ($p = 0.023$). In contrast, the wait-list control group did not exhibit any significant changes across the measured parameters.

Conclusion

The structured 12-week yoga intervention led to significant improvements in students' knowledge, attitudes, and practices related to yoga, along with beneficial changes in lifestyle behaviours. Positive outcomes were also observed in key anthropometric and physiological indicators, including BMI, heart rate, and blood pressure. While the intervention successfully addressed several barriers to yoga practice, time limitations remained a challenge, emphasizing the importance of institutional initiatives to integrate yoga into academic settings.

Key Words: *Yoga, (KAP), Undergraduate student, Anthropometric and physiological parameters, Dietary habits.*

INTRODUCTION:

Undergraduate students often face substantial psychological and physiological stress due to the demanding nature of academic curricula, competitive assessment environments, and high expectations to succeed. In addition to academic challenges, they frequently encounter personal stressors such as financial insecurity, social isolation, and the emotional impact of living away from family for extended periods. These cumulative pressures contribute to persistent stress, which has been closely linked to poor academic performance, maladaptive coping mechanisms, sedentary behaviours, and increased vulnerability to mental health conditions such as anxiety and depression [1].

In recent years, there has been growing global recognition of the need for holistic approaches to promote student wellness. Among these, yoga has emerged as a promising lifestyle intervention. Yoga, with its integrated focus on physical postures (asanas), breath regulation (pranayama), and meditation (dhyana), supports both physical fitness and mental well-being. Despite extensive evidence supporting its benefits, the implementation of structured yoga programs within Indian academic institutions remains minimal, largely due to a lack of systematic planning, awareness, and institutional prioritization [1, 2].

Several studies have explored the knowledge, attitude, and practice (KAP) of yoga among student populations, particularly those in health-related fields. For example, Hegde et al. (2018) [3] assessed yoga KAP among 300 medical undergraduates and reported substantial improvement in awareness and the use of yoga as a strategy to manage stress. In a similar study, Ankamreddy et al. (2019) [4] evaluated 260 medical students and found that while over 70% held a positive attitude toward yoga, actual engagement in regular practice remained limited, underscoring the importance of supportive environments and motivation. Additionally, Jaiswal et al. (2024) [5] investigated KAP related to yoga among 372 healthcare professionals, reporting satisfactory levels of knowledge and attitude, but emphasizing the necessity for formal institutional frameworks to facilitate consistent practice.

Yoga is particularly suitable for student populations as it offers a low-cost, low-risk, and space-efficient intervention. Unlike traditional exercise routines that may require equipment or gym access, yoga can be practiced in small spaces with minimal resources. It emphasizes relaxation, emotional regulation, and mind-body integration, making it both physically and psychologically appealing to students [6-10]. Furthermore, several studies have reported significant reductions in stress and anxiety among students engaged in yoga programs. For instance, Lemay et al. (2019) [11] demonstrated that a structured six-week yoga and meditation program significantly alleviated stress and anxiety symptoms among university students.

Beyond psychological benefits, yoga has also been shown to positively influence physiological health, including improvements in cardiovascular function, metabolic regulation, and immune response. Particularly among students in healthcare disciplines, yoga has been associated with enhanced cognitive function, emotional resilience, and improved academic focus [1, 7]. Despite these promising outcomes, most existing research has predominantly focused on the general adult population. Very few studies have rigorously investigated the impact of structured yoga interventions within undergraduate student settings—especially in Indian institutions. Moreover, limited data exist regarding how such interventions influence not only KAP but also objective measures such as anthropometric indices, physical activity levels, and physiological parameters [3, 4, 12-18].

In light of these gaps, the current study was designed to evaluate the outcomes of a 12-week structured yoga intervention on undergraduate students. The primary objectives include assessing changes in yoga-related knowledge, attitudes, and practices, as well as evaluating the influence of yoga on dietary habits, physical activity patterns, and key anthropometric and physiological indicators. By adopting a comprehensive approach, this study seeks to provide valuable insights into the feasibility and effectiveness of integrating yoga into academic life for promoting holistic student well-being.

METHODOLOGY

Study Design and Participants

A single-blinded randomized controlled trial (RCT) was conducted at Nanjappa Institute of Allied Health Sciences, Shivamogga, Karnataka, India, from March 2024 to March 2025. The study targeted first-year undergraduate students enrolled in Allied Health Science programs. Ethical approval for the study was obtained from the Institutional Ethics Committee (Approval No. 06/AHS/EC/2024), and the trial was prospectively registered with the Clinical Trials Registry – India (CTRI/2025/01/079735).

A total of 178 students aged 18–20 years, both male and female, were recruited. Participants provided written informed consent prior to enrollment. Those with previous experience in yoga or existing health conditions such as asthma or seizures were excluded to minimize potential confounding variables. The students were randomly assigned to either the intervention group (n = 89) or the wait-list control group (n = 89) using simple random sampling.

Data Collection

Following informed consent, participants completed a self-administered, pre-validated questionnaire in the classroom setting within one hour. No incentives were offered. The questionnaire, adapted from Hegde et al. [19], assessed sociodemographic characteristics, lifestyle patterns, dietary behavior, physical activity, yoga-related knowledge, attitudes and practices, as well as perceived barriers. Baseline and follow-up data were collected at two time points—prior to and after the 12-week intervention. At each time point, participants first completed the questionnaire, followed by anthropometric assessments. Recruitment was conducted in classrooms, where a detailed explanation of the study objectives and procedures was provided

Pilot study

A pilot study with 20 undergraduate participants confirmed the clarity and feasibility of the study tools. Physical activity increased (30% to 70%), yoga interest rose (30% to 90%), and yoga knowledge improved. Physiological measures showed reduced BMI, heart rate and blood pressure. These findings confirmed feasibility and helped refine the main study design. Pilot data were not included in the final analysis.

Anthropometric Measurements

Anthropometric parameters included body mass index (BMI) and waist circumference. Each measurement was performed by a trained third-party examiner. Results were written on paper slips and handed to participants, who recorded the values on their questionnaires before submitting them anonymously. Body weight was measured using a digital scale with 0.5 kg accuracy, with participants standing barefoot in light clothing. Height was measured using a stadiometer. Waist circumference was measured using a non-stretchable tape at the midpoint between the iliac crest and the lower rib, recorded at the end of a normal expiration.

Yoga Intervention

Participants in the intervention group engaged in a structured 12-week yoga program, conducted five days per week under the supervision of a certified instructor. Attendance was monitored daily to ensure compliance. The session structure comprised approximately 35 minutes of Hatha yoga (physical postures), 10 minutes of pranayama (breathing exercises), and 15 minutes of guided meditation focused on mindfulness and relaxation. The yoga postures included a variety of warm-up, standing, seated, backbend, and relaxation poses (Table 1).

Wait-list Control Group

The wait-list control group consisted of participants who did not receive the yoga intervention during the study period. They were placed on a three-month wait-list and, for ethical considerations, were offered a five-day yoga orientation session after study completion

Knowledge, Attitude, and Practice (KAP) Questionnaire

It consisted of 16 multiple-choice items divided across two sections: one focused on sources and depth of yoga knowledge, and the other on practical engagement in yoga components such as asanas, pranayama, and meditation. The questionnaire also included items assessing perceptions of health benefits, previous yoga

experience, barriers to practice, dietary habits, and levels of physical activity[19]. Responses were recorded on a Likert scale ranging from 1 to 5. Data were collected at baseline and post-intervention. (See Supplementary File 1 for full questionnaire.)

Compliance

Participant adherence to the yoga intervention was assessed based on the frequency of session attendance. High compliance was defined as attending 5–6 days per week, moderate compliance as 3–4 days, and low compliance as 1–2 days or irregular attendance. Approximately 85% of participants demonstrated high compliance, 10% had moderate compliance, and 5% showed low or irregular attendance.

Adverse Events

No adverse events were reported during the study period.

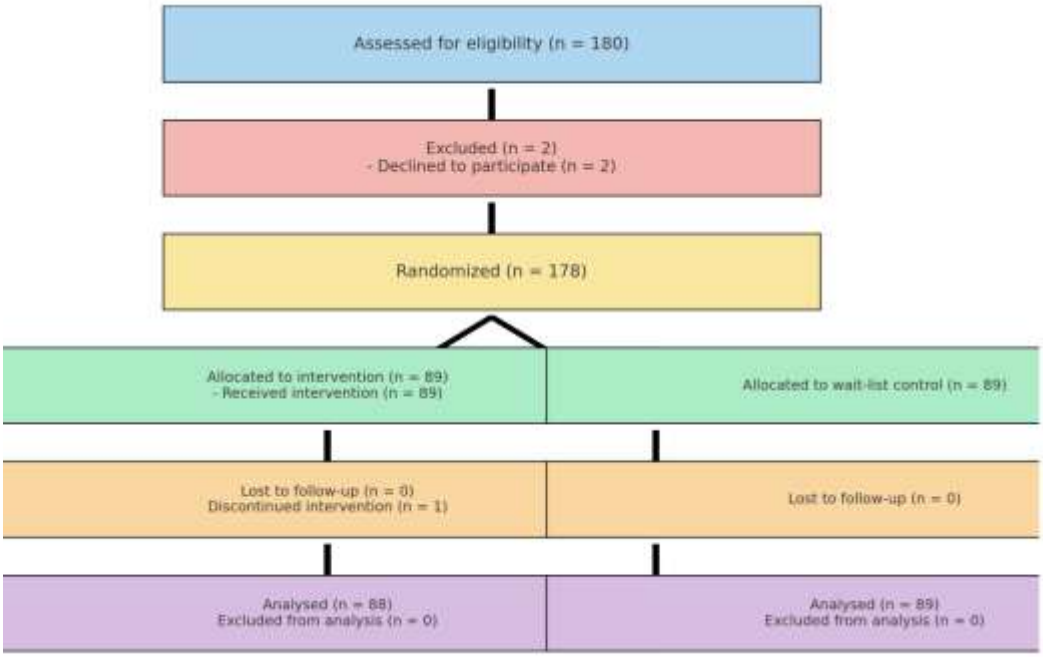
Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics Version 26.0. Descriptive statistics were used to summarize baseline characteristics. The McNemar test was employed for categorical paired variables, and paired t-tests and independent t-tests were used for continuous variables. Chi-square tests were applied to assess between-group differences in categorical variables. A p-value of less than 0.05 was considered statistically significant.

CONSORT Flow Diagram

The flow of participants through each stage of the trial is presented in the CONSORT diagram (Figure 1).

Figure 1: CONSORT Flow Diagram- It illustrates the progression of participants through the randomized controlled trial on a 12-week yoga intervention among undergraduate students. A total of 180 students were assessed for eligibility, with 2 declining to participate. The remaining 178 were randomized equally into



intervention and wait-list control groups. The diagram uses colour-coded boxes to represent each phase: blue for enrollment, pink for exclusion, yellow for randomization, green for group allocation, orange for follow-up, and purple for final analysis. Arrows indicate the movement of participants through the study, showing high retention and minimal loss to follow-up.

RESULTS

Data from 178 participants revealed no significant difference in age between the intervention and wait-list control groups, and gender distribution was comparable. However, a statistically significant difference was observed in area of residence (urban/rural), with a p-value of 0.046.

Dietary Behavior and Physical Activity

Significant improvements in dietary behavior and physical activity were observed among participants in the intervention group compared to the wait-list control group (Table 2). In the intervention group, the proportion of participants reporting high-frequency consumption of processed foods decreased from 39.3% at baseline to 13.4% at follow-up, while those reporting low-frequency consumption increased from 15.7% to 31.5% ($p < 0.001$). These changes indicate a clear shift toward healthier dietary patterns following the intervention. In contrast, the waitlist control group showed no significant change, with high-frequency consumption remaining nearly the same (54.9% at baseline to 53.9% at follow-up; $p = 0.686$). Salad and fresh food intake also improved significantly in the intervention group ($p < 0.001$). In contrast, the wait-list control group showed non-significant changes in fresh food intake ($p = 0.089$). Regarding physical activity, a statistically significant improvement was observed in the intervention group ($p = 0.002$), with the proportion of participants engaging in moderate activity increasing from 42.7% to 62.9%, and those engaging in intense activity rising from 23.6% to 29.2%. No comparable change was observed in the waitlist control group ($p = 0.269$), where activity levels remained largely unchanged (Table 2).

Anthropometry & Physiological Parameters

Anthropometric and physiological measures were compared between groups (Table 3). At baseline, no significant differences were found in systolic or diastolic blood pressure. However, at follow-up, the wait-list control group exhibited a significantly higher diastolic blood pressure (78.67 ± 5.71 mmHg) compared to the intervention group (76.79 ± 5.47 mmHg; $p = 0.026$), suggesting a potential protective effect of the intervention.

Although the intervention group had a significantly higher heart rate at baseline ($p < 0.001$), a marked reduction was observed by follow-up, resulting in a significantly lower heart rate than the wait-list control group ($p = 0.050$). This change indicates a possible beneficial effect of the intervention on resting heart rate.

BMI significantly decreased in the intervention group from baseline to follow-up (23.7 ± 3.1 to 22.8 ± 2.9; $p = 0.004$), whereas no significant change was observed in the wait-list control group (23.4 ± 2.8 to 23.5 ± 2.9; $p = 0.672$). No significant differences were observed in waist circumference, either within or between groups ($p > 0.05$).

Knowledge, Practice, and Perceptions

Changes in yoga-related knowledge, practice, perceived benefits, and future interest are summarized in (Table 5). At baseline, 57.3% of participants in the intervention group reported no prior yoga practice. By follow-up, all participants in this group had engaged in yoga practice ($p < 0.001$), whereas no significant change was observed in the control group ($p = 0.879$).

A significant shift was also noted in the reported source of yoga knowledge among intervention participants, with those citing school or college as their source increasing from 7.9% to 33.7% ($p = 0.007$). No such change was seen in the wait-list control group. Participants' knowledge of yoga, as assessed by the scoring criteria in the study tool, improved significantly in the intervention group. The proportion categorized as having good knowledge increased from 34.8% at baseline to 57.3% at follow-up ($p < 0.001$). While most participant at baseline identified stress relief and academic improvement as key benefits of yoga, by follow-up nearly half (49.4%) recognized all of the listed benefits, including improved concentration ($p < 0.001$) However, the proportion of participants in the intervention group expressing a likeliness to continue yoga on a daily basis increased from 32.6% to 92.1% ($p < 0.001$), whereas no significant change was observed in the wait-list control group ($p = 0.550$).

Barriers to Yoga Practice

Our study the reported barriers to yoga practice in both groups. At baseline, the most frequently mentioned barrier in the intervention group was lack of time, reported by 51.7% of participants. This remained almost the same at follow-up (53.5%), suggesting that students continued to find it difficult to incorporate yoga into their daily routine, likely due to academic pressures and busy schedules. The barrier of insufficient facilities showed a modest improvement in the intervention group, with the proportion of participants reporting it decreasing from 25.8% at baseline to 23.9% at follow-up ($p = 0.014$), suggesting better perceived access to yoga facilities after the intervention. In contrast, the wait-list control group showed a modest increase, from 23.6% to 25.8% ($p = 0.024$), indicating a lack of improvement without intervention. Lack of interest was consistently higher in the wait-list control group at both baseline (36.0%) and follow-up (33.7%) than in the intervention group (18.0% and 20.0%, respectively), indicating that the intervention may have helped sustain participant motivation. A less common but persistent barrier, lack of company, was reported exclusively by the intervention group, though at low levels (4.5% at baseline and 3.5% at follow-up) (Figure 2). Overall, the intervention contributed to a modest reduction in barriers such as limited facilities and low interest however, time constraints remained largely unchanged, highlighting the need for structural solutions to address scheduling challenges.

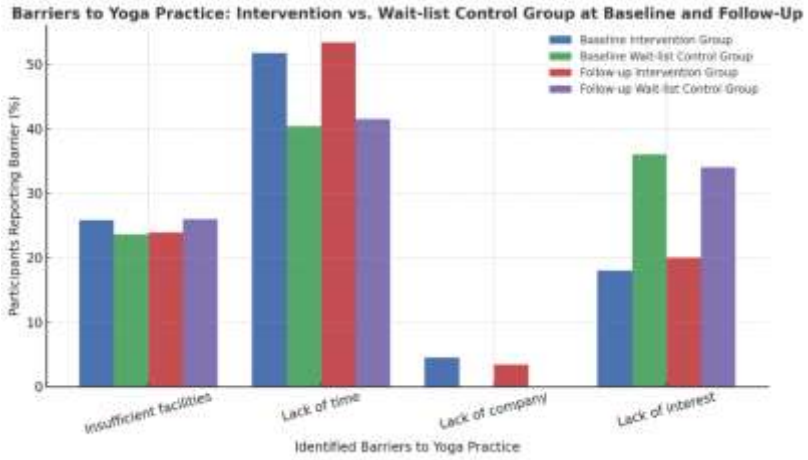


Figure 2: Reported Barriers to Yoga Practice Among Intervention and Wait-list Control Groups at Baseline and Follow-Up

Table 1: Structured 12-Week Yoga Intervention: Session Structure, Postures, Breathing, and Meditation Techniques

Section	Name/Item	Category / Focus Area	Benefits / Key Elements	Duration	Repetitions / Cycles
12-Week Session Structure	Introduction to Yoga	Basic asanas, pranayama	Foundational postures and breathing techniques	Weeks 1–4	–
	Intermediate Level	Complex asanas, intro to meditation	Transition to deeper postures and meditation	Weeks 5–8	–

Section	Name/Item	Category / Focus Area	Benefits / Key Elements	Duration	Repetitions / Cycles
	Advanced Practice	Advanced asanas, deep meditation	Emphasis on endurance, flexibility, and mindfulness	Weeks 9–12	–
oga Postures	Surya Namaskara	Warm-up	Full-body activation, energization, mental focus	~5 min	5 sets
	Tadasana	Standing	Enhances posture, balance, and alignment	30 sec – 1 min	5 sets
	Adho Mukha Svanasana	Standing	Stretches spine, hamstrings, calves; boosts circulation	30 sec – 1 min	5 sets
	Virabhadrasana	Standing	Strengthens legs and core; improves stamina	30 sec – 1 min/side	5 sets
	Trikonasana	Standing	Increases spinal and hip flexibility, stability	30 sec – 1 min/side	5 sets
	Paschimottanasana	Seated	Stretches hamstrings and lower back, calms mind	30 sec – 1 min	5 sets
	Bhujangasana	Backbend	Strengthens back, opens chest, relieves fatigue	30 sec – 1 min	5 sets
	Balasana	Relaxation	Alleviates fatigue and stress, calms nervous system	1–2 min	5 sets
	Savasana	Relaxation	Deep relaxation, integration of practice	2–5 min	1 set
Breathing Techniques	Nadi Shodhana	Seated	Balances nervous system, promotes mental clarity	3–5 min	3–5 cycles/nostril
	Sitali	Seated	Cooling effect, reduces stress and anger	2–3 min	5–7 cycles
	Brahmari	Seated	Induces calm, reduces anxiety and fatigue	2–3 min	5–7 cycles
	Ujjayi	Seated	Enhances lung capacity, induces calm	3–5 min	5–7 cycles
Meditation Techniques	Guided Meditation	Mindfulness	Improves awareness, reduces stress	5–10 min	1 session
	Music Meditation	Relaxation	Emotional regulation through soft auditory input	5–10 min	1 session

Table 2: Comparison of Processed Food Consumption, Salad/Fresh Food Intake, and Physical Activity from Baseline to Follow-Up in Intervention and Wait-list Control Groups

Group	Category	Period	Mild n (%)	Moderate n (%)	Excessive n (%)	p-value
Intervention	Processed Food Intake	Baseline	14 (15.7%)	40 (44.9%)	35 (39.3%)	<0.001 (VHS)
		Follow-up	28 (31.5%)	49 (55.1%)	12 (13.4%)	
Wait-list Control	Processed Food Intake	Baseline	10 (11.2%)	31 (34.8%)	48 (53.9%)	0.686 (NS)
		Follow-up	4 (4.5%)	37 (41.6%)	48 (53.9%)	
Intervention	Salad/Fresh Food Intake	Baseline	22 (24.7%)	55 (61.8%)	12 (13.5%)	<0.001
		Follow-up	1 (1.1%)	53 (59.6%)	35 (39.3%)	
Wait-list Control	Salad/Fresh Food Intake	Baseline	31 (34.8%)	51 (57.3%)	7 (7.9%)	0.089 (NS)
		Follow-up	21 (23.6%)	58 (65.2%)	10 (11.2%)	
Intervention	Physical Activity Level	Baseline	30 (33.7%)	38 (42.7%)	21 (23.6%)	0.002
		Follow-up	7 (7.9%)	56 (62.9%)	26 (29.2%)	
Wait-list Control	Physical Activity Level	Baseline	34 (38.2%)	49 (55.1%)	6 (6.7%)	0.269 (NS)
		Follow-up	28 (31.5%)	52 (58.4%)	9 (10.1%)	

Table 3: Comparison of Physiological Parameters Between Intervention and Waitlist Control Groups at Baseline and Follow-Up

Measure	Intervention (Mean ± SD)	Wait-list Control (Mean ± SD)	p-value
Systolic BP (Baseline)	120.43 ± 6.35	118.37 ± 10.81	0.124 (NS)
Systolic BP (Follow-up)	120.03 ± 4.66	118.47 ± 10.23	0.192 (NS)
Diastolic BP (Baseline)	75.93 ± 8.48	74.70 ± 7.44	0.303 (NS)
Diastolic BP (Follow-up)	76.79 ± 5.47	78.67 ± 5.71	0.026 (S)
Heart Rate (Baseline)	81.72 ± 6.84	87.99 ± 9.17	<0.001 (VHS)
Heart Rate (Follow-up)	84.35 ± 5.73	86.44 ± 8.21	0.050 (MS)
Waist Circumference (Baseline)	76.23 ± 8.78	78.49 ± 10.42	0.121 (NS)
Waist Circumference (Follow-up)	76.43 ± 8.51	78.63 ± 10.45	0.128 (NS)
SpO_2 (Baseline)	95.35 ± 5.69	96.76 ± 3.14	0.043 (S)
SpO_2 (Follow-up)	97.63 ± 5.19	96.92 ± 2.93	0.270 (NS)
BMI (Baseline)	20.89 ± 3.65	22.22 ± 4.36	0.029 (S)
BMI (Follow-up)	20.83 ± 3.73	22.63 ± 4.47	0.004 (VHS)

Table 4: Comparison of Yoga Knowledge, Practice, Perceived Benefits, and Interest in Yoga from Baseline to Follow-Up in Both Groups

Group	Period	Total	Count (Baseline) %	Count (Follow-up)) %	Total count	p-value
Intervention	**Past Yoga Practice**	No	51 (57.3%)	0 (0.0%)	51	<0.001
		Yes	38 (42.7%)	89(100.0%)	127	
	Source of Knowledge	Newspaper	9(10.1%)	11 (12.4%)	20	0.007
		Mass Media	30 (33.7%)	19 (21.3%)	49	
		Family/Friends	43 (48.3%)	29 (32.6%)	72	
		School/College	7 (7.9%)	30 (33.7%)	37	
	Knowledge of Yoga	Poor	31 (34.8%)	1 (1.1%)	32	<0.001
		Average	27 (30.3%)	2 (2.2%)	29	
		Good	31 (34.8%)	51 (57.3%)	82	
	Knowledge of Health Benefits of Yoga	Poor	43 (48.3%)	1 (1.1%)	44	<0.001
		Average	43 (48.3%)	0 (0.0%)	43	
		Good	3 (3.4%)	88 (98.9%)	91	
	Perceived Benefits of Yoga	Stress Management	54 (60.7%)	1(1.1%)	55	<0.001
		Academic Performance	35 (39.3%)	0(0.0%)	35	
		Improved Concentration	0(0.0%)	44(49.4%)	44	
		All of the Above	0(0.0%)	44(49.4%)	44	
	Interest in Practicing Yoga in Future	Yes	29(32.6%)	82(92.1%)	111	<0.001
		No	60(67.4%)	7(7.9%)	67	
Waitlist Control	**Past Yoga Practice**	No	51 (57.3%)	52(58.4%)	103	0.879
		Yes	38 (42.7%)	37(41.6%)	75	
	Source of Knowledge	Newspaper	5 (5.6%)	20(22.5%)	25	0.953
		Mass Media	43(48.3%)	23(25.8%)	66	
		Family/Friends	35(39.3%)	31(34.8%)	66	
		School/College	6(6.7%)	15(16.9%)	21	
	Knowledge of Yoga	Poor	35(39.3%)	26(29.2%)	61	0.014
		Average	50(56.2%)	46(51.7%)	96	
		Good	4(4.5%)	17(19.1%)	21	
	Knowledge of Health Benefits of Yoga	Poor	37(41.6%)	26(29.2%)	63	0.015

Group	Period	Total	Count (Baseline) %	Count (Follow-up)) %	Total count	p-value
		Average	36(40.4%)	36(40.4%)	72	
		Good	16(18.0%)	27(30.3%)	43	
	Perceived Benefits of Yoga	Stress Management	24(27.0%)	19(21.3%)	43	
		Academic Performance	30(33.7%)	31(34.8%)	61	0.215
		Improved Concentration	33(37.1%)	29(32.6%)	62	
		All of the Above	2(2.2%)	10(11.2%)	12	
	Interest in Practicing Yoga in Future	Yes	82(92.1%)	84(94.4%)	166	0.550
		No	7(7.9%)	5(5.6%)	12	

DISCUSSION

This study evaluated the impact of a 12-week structured yoga intervention on the KAP related to yoga, as well as on lifestyle behaviours and physiological parameters among undergraduate students, compared to a wait-list control group. The findings highlight yoga's potential as a practical, low-cost, and holistic intervention for promoting physical, emotional, and behavioral well-being in young adults, particularly within academic environments.

Undergraduate students are particularly vulnerable to emotional distress due to the cumulative burden of academic stress, shifting social dynamics, and limited coping mechanisms [10]. Although multiple strategies are available for stress reduction, structured physical activities such as yoga are often underutilized in this population. In the present study, the 12-week intervention resulted in notable improvements across several domains of student health, suggesting that yoga may serve as an accessible gateway to broader health-promoting behaviors.

One of the most significant outcomes was the improvement in dietary habits. Participants in the intervention group demonstrated a marked decrease in the consumption of processed and convenience foods—including packaged snacks, fried items, sugary drinks, and instant meals—which are commonly overconsumed by college students. Concurrently, there was a significant increase in the intake of fresh fruits and vegetables, reflecting enhanced dietary awareness and healthier eating practices. These behavioral shifts likely reflect the influence of yoga's underlying philosophy, which promotes mindfulness and conscious living. Conversely, the wait-list control group exhibited no significant dietary changes, reinforcing the role of yoga in facilitating intentional and health-oriented dietary decisions.

Physical activity patterns also improved among intervention participants. The proportion engaging in moderate-intensity physical activity increased from 42.7% to 62.9%, while those participating in vigorous activity rose from 23.6% to 29.2%. This suggests that participation in yoga may serve as a motivational and accessible entry point into a more active lifestyle. In contrast, the control group showed no meaningful changes in activity levels, emphasizing the effectiveness of structured, guided programs in instilling regular exercise habits.

In terms of physiological outcomes, the yoga group maintained a stable BMI over the 12-week period, whereas the control group experienced a gradual increase. This suggests that regular yoga practice may aid in maintaining healthy body weight, possibly by influencing metabolism, reducing stress-related eating, and encouraging healthier lifestyles. Additionally, a significant reduction in resting heart rate was observed in the intervention group, indicating improved cardiovascular function and autonomic balance. Although both

groups experienced a slight rise in diastolic blood pressure, the increase was less pronounced in the yoga group, suggesting a potential regulatory effect of yoga on vascular tone and stress-related blood pressure elevations. These observations are consistent with earlier research demonstrating the cardioprotective effects of yoga through mechanisms such as vagal activation, enhanced baroreceptor sensitivity, and hormonal modulation [1,7,13].

Notably, substantial improvements were also recorded in yoga-related KAP. Knowledge levels rose from 34.8% at baseline to 57.3% post-intervention, and awareness regarding yoga's broad health benefits surged from 33.4% to 98.9%. This indicates that the intervention effectively educated students about the holistic nature of yoga, moving beyond its perception as merely a physical activity. The increase in practical engagement was also striking—while 57.3% of participants had never practiced yoga prior to the intervention, by the end, all had attended sessions regularly. This suggests strong acceptability and feasibility of implementing yoga within academic curricula.

Another noteworthy outcome was the shift in the source of yoga-related information. The proportion of students citing their educational institution as the primary source rose from 7.9% to 33.7%, highlighting the influential role that colleges can play in shaping health behaviours. Additionally, motivation to continue yoga practice beyond the study period significantly increased from 32.6% to 92.1%, indicating a positive attitudinal shift driven by firsthand experience with its benefits.

These findings are consistent with a growing body of literature highlighting yoga's psychological benefits. Previous studies have demonstrated that yoga contributes to reductions in stress, anxiety, and negative affect, particularly in academic settings (17). For instance, Case-Smith et al. (2010) [14] observed improved emotional regulation and calmness among school-aged children following regular yoga practice—effects that are mirrored in the emotional and behavioral improvements reported in our study. Similarly, O'Driscoll et al. (2017) [16], in a systematic review, concluded that mindfulness-based interventions—including yoga—enhanced emotional resilience among students in health science programs. Khalsa et al. (2012) [20] further supported these outcomes, demonstrating that school-based yoga programs were associated with reductions in anger, fatigue, and other negative emotional states.

However, despite the evident benefits, barriers to yoga practice remain. In our study, the most frequently cited obstacle across both groups was lack of time, affecting approximately 52% of participants. While the intervention effectively reduced barriers such as disinterest and inadequate access to facilities, time constraints remained a major concern. These findings are consistent with those of Hegde et al. (3), who reported that although medical students were generally aware of yoga's benefits, practice rates were low due to scheduling challenges and limited institutional support. This emphasizes the need for systemic efforts to integrate wellness activities such as yoga into academic timetables, ensuring that students have the opportunity and environment to engage in them regularly.

Overall, the present study demonstrates that structured yoga interventions can significantly enhance students' physical and psychological well-being, improve health-related knowledge and behaviours, and foster sustainable lifestyle changes. Importantly, it also highlights the potential of academic institutions to serve as catalysts for these transformations when they invest in structured, evidence-based wellness programs.

Limitations

The present study was limited by its use of a closed-ended questionnaire, which may have constrained participants' ability to fully convey their perspectives. Due to the small and demographically homogeneous sample, the applicability of the findings to wider student populations may be constrained. Although the 12-week duration was adequate to assess short-term effects, it may not reflect the long-term sustainability of the observed benefits. Data were primarily collected through self-reported questionnaires, which, although efficient for larger samples, may be subject to response bias. The study also focused on selected physiological measures and did not include qualitative methods such as interviews or open-ended feedback, which might have offered deeper insights into participants' experiences and the broader impact of the intervention.

Strengths and Recommendations

Despite these limitations, the study has notable strengths, including its randomized controlled design, structured intervention protocol, and the combination of lifestyle, anthropometric and physiological, outcome measures. The inclusion of a waitlist control group enhanced internal validity and allowed for clearer attribution of effects to the intervention. Based on the findings, it is recommended that future studies incorporate mixed-method approaches, longer follow-up durations, and more diverse participant groups to assess the sustained impact and broader applicability of yoga-based interventions. Integrating qualitative feedback may also help tailor programs to better meet student needs and institutional contexts.

CONCLUSION:

This study highlights that a 12-week structured yoga intervention significantly enhanced the health and well-being of undergraduate students compared to a wait-list control group. Improvements were observed in yoga-related knowledge, attitudes, and practices, alongside positive lifestyle changes and increased motivation for continued practice. Physiological benefits included stable BMI, lower resting heart rate, and better blood pressure regulation. The intervention also reduced common barriers to participation and emphasized the important role of educational institutions in promoting wellness. However, time constraints remained a challenge, pointing to the need for institutional strategies to integrate such interventions into academic life. When integrated into educational settings in a structured manner, yoga can promote sustainable improvements in students' health behaviors and psychosocial well-being.

Conflict-of-Interest Statement

The authors have no conflicts of interest to disclose.

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