

# EFFECTIVENESS OF FIT INDIA FITNESS PROTOCOL ON CARDIOVASCULAR ENDURANCE AMONG COLLEGE STUDENTS

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## ABSTRACT

The Fit India Movement, initiated by the Indian government, aims to enhance health and well-being through yoga and physical fitness activities. This study investigated the effect of the Fit India Fitness Protocol (FIFP) on the cardiovascular endurance of Junior College students. It randomly selected 60 male students aged 16 to 19 from Govt Junior College, Narasannapeta, Srikakulam and assigned them to four groups, each including 15 members. Group I engaged in physical fitness exercises, Group II performed yoga, Group III participated in both physical fitness and yoga, while Group IV served as the control group. The intervention lasted 12 weeks, during which individuals in the treatment groups trained three days a week, while the control group adhered to their regular routines. We used the 2 km walk/run test as the criterion variable to evaluate the differences in cardiovascular endurance among the groups. A one-way analysis of covariance (ANCOVA) employing pre-reading cardiovascular endurance as a covariate revealed that all three treatment groups had significantly greater cardiovascular endurance compared to the control group. The Bonferroni post-hoc test indicated that the physical fitness exercise group (Group I) attained the greatest improvements in cardiovascular endurance. The data indicate that the Fit India physical fitness exercise protocol significantly improves the cardiovascular endurance along with the health and well-being of the law college students.

**Key words:** - Training Protocol, Fit India, Cardiovascular Endurance, Physical Fitness

## INTRODUCTION

Physical fitness is essential for overall health and well-being. Addressing concerns about sedentary lifestyles, the Indian government launched the Fit India Movement in 2019, encouraging regular physical activity and yoga. Structured programs like the Fit India Fitness Protocol (FIFP) provide guidelines to improve physical and mental health.

Fitness enhances the efficiency of the heart, lungs, and muscles, enabling individuals to perform daily tasks with energy and reduced health risks. It supports optimal physical performance and stress management, yet many in society lack sufficient activity to maintain good health.

Cardiovascular endurance (CVE) measures the ability of the heart, lungs, and

circulatory system to sustain prolonged activity, essential for aerobic capacity and overall fitness (ACSM, 2018). Activities like running and cycling enhance CVE, which is crucial for college students facing stress, sedentary behaviour, and irregular schedules. Building Cardiovascular endurance during college reduces the risk of chronic diseases such as cardiovascular issues, hypertension, diabetes, and obesity (Warburton et al., 2006). It promotes healthy weight, metabolism, and immunity, laying the foundation for long-term well-being and a healthier future.

- **OBJECTIVE:** To analyze the impact of a physical fitness, yoga and combined intervention programs aligned with the Fit India Fitness Protocol on the cardiovascular endurance of college students.
- **HYPOTHESES:** It was hypothesized that a 12-week Fit India physical fitness, yoga and combined intervention program would lead to a significant improvement in the cardiovascular endurance of college students.

## METHODOLOGY

The study employed a randomized treatment design with 60 male students aged 16-19 from Govt Junior College, Narasannapeta, Srikakulam, divided into four groups: Physical Fitness, Yoga, Combined, and Control, each consisting of 15 participants. Over 12 weeks, the intervention groups underwent three weekly training sessions, while the Control group received no training. Cardiovascular endurance was assessed using a 2 km walk/run test before and after the intervention. Participants were selected based on criteria such as age, willingness to participate, and absence of medical conditions affecting physical activity. Data were analyzed using ANCOVA, with pre-test readings as covariates. Statistical tools, including bar diagrams, profile plots, and Bonferroni post-hoc tests, were used for detailed comparisons, with significance set at a 0.05 confidence level.

## ANALYSIS OF DATA AND INTERPRETATION

**Table 1: Group-Based Descriptive Statistics on Cardiovascular Endurance, with Pre- and Post-Adjusted Means**

| Groups           | Tests | Min   | Max   | Mean   | S D Error of mean | S D   |
|------------------|-------|-------|-------|--------|-------------------|-------|
| Control          | Pre   | 9.14  | 14.54 | 11.333 | 0.382             | 1.712 |
|                  | Post  | 9.09  | 14.49 | 11.242 | 0.369             | 1.653 |
| Physical Fitness | Pre   | 10.12 | 16.08 | 12.430 | 0.336             | 1.506 |
|                  | Post  | 8.47  | 11.56 | 9.815  | 0.166             | 0.744 |
| Yoga             | Pre   | 10.50 | 15.18 | 12.965 | 0.273             | 1.223 |
|                  | Post  | 9.34  | 13.18 | 10.940 | 0.251             | 1.126 |
| Combined         | Pre   | 10.23 | 16.11 | 12.729 | 0.312             | 1.399 |
|                  | Post  | 9.12  | 12.46 | 10.245 | 0.197             | 0.882 |

**Interpretation:** The table 1 presents the descriptive statistics for Cardiovascular Endurance (CVE) based on pre- and post-test data from the treatment and control groups. The findings are summarized as follows:

The table 1 shows the descriptive statistics for cardiovascular endurance (CVE) across

all groups. The Control Group's mean CVE score slightly declined from 11.333 (SD = 1.712), to 11.242, (SD = 1.653) indicating minimal change. The Physical Fitness Group demonstrated the most significant improvement, with mean scores improving from 12.430 (SD = 1.506) to 9.815, (SD = 0.744) reflecting enhanced endurance and consistent performance. The Yoga Group showed a positive impact, with scores improving from 12.965 (SD = 1.223) to 10.940, (SD = 1.126) indicating uniform progress. The Combined Group also experienced steady gains, with scores improving from 12.729 (SD = 1.399), to 10.245 (SD = 0.882). These results highlight the effectiveness of all interventions, particularly physical fitness training, in improving cardiovascular endurance

All treatment groups improved cardiovascular endurance, with the Physical Fitness Group achieving the greatest gains, followed by the Combined and Yoga Groups. The Control Group showed minimal change, highlighting the effectiveness of targeted exercise programs, especially physical fitness training, for enhancing endurance in college students.

**Table 2: Analysis of Covariance (ANCOVA) results of the Intervention program on Cardiovascular Endurance**

| Source         | Sum of Squares | df | Mean Square | F-ratio | p-value |
|----------------|----------------|----|-------------|---------|---------|
| Pre CVE        | 68.857         | 1  | 68.857      | 158.673 | < 0.05* |
| Between Groups | 49.320         | 3  | 16.440      | 37.884  | <0.05*  |
| Within Groups  | 32.547         | 75 | 0.434       | -       | -       |

*\*Indicates that the results are significant at < 0.05 level*

**Inference:** Table 3 reveals a significant difference in post-intervention cardiovascular endurance scores among the groups ( $p < 0.05$ ) after adjusting for pre-test scores. The treatment groups showed substantial improvements, while the control group showed no significant change. A post-hoc test identified specific differences between the groups.

**Table 3: Pre, Post and Adjusted Post test Mean scores of Cardiovascular Endurance**

| Group            | Pre-test | Post-test | Adjusted post (for pre-test) |
|------------------|----------|-----------|------------------------------|
| Control          | 11.333   | 11.242    | 11.910                       |
| Physical Fitness | 12.430   | 9.815     | 9.773                        |
| Yoga             | 12.965   | 10.940    | 10.551                       |
| Combined         | 12.729   | 10.245    | 10.009                       |

**Interpretation:** Table 3 shows the cardiovascular endurance (CVE) scores for each group before, after, and after adjustment. The Control Group's mean score slightly decreased from 11.133 in the pre-test to 10.677 in the post-test, but adjusted to 11.350. The Physical Fitness Group had a significant improvement, with the score decreasing from 12.729 in the pre-test to 9.815 in the post-test, and adjusting to 9.750. The Yoga Group also showed

improvement, with scores moving from 12.965 to 10.940, and adjusted to 10.569. The Combined Group saw a decrease from 12.729 in the pre-test to 10.245 in the post-test, adjusting to 10.009. Overall, the treatment groups exhibited notable improvements in cardiovascular endurance, especially after the interventions.

**Table 4: Bonferroni Post Hoc test Analysis of Adjusted Post test Means of Treatment and Control groups on Cardiovascular Endurance**

| Groups           |        |          |         | Mean Difference | p-value | (95% confidence Interval for Difference) |             |
|------------------|--------|----------|---------|-----------------|---------|------------------------------------------|-------------|
| Physical Fitness | Yoga   | Combined | Control |                 |         | Lower Bound                              | Upper Bound |
| 9.773            | -      | -        | 11.910  | 2.137           | < 0.05* | 1.552                                    | 2.721       |
| -                | 10.551 | -        | 11.910  | 1.358           | < 0.05* | 0.750                                    | 1.967       |
| -                | -      | 10.009   | 11.910  | 1.900           | < 0.05* | 1.303                                    | 2.497       |
| 9.773            | 10.551 | -        | -       | 0.778           | 0.002*  | -1.348                                   | 0.209       |
| 9.773            | -      | 10.009   | -       | 0.236           | 1.000   | 0.802                                    | 0.330       |
| -                | 10.551 | 10.009   | -       | 0.542           | 0.068*  | 0.023                                    | 1.108       |

*\*Indicates that the results are significant at < 0.05 level*

**Inference:** The 4 indicates the adjusted mean cardiovascular endurance scores showed statistically significant differences between the control group and the physical fitness, yoga, and combined groups, with p-values below 0.05. However, no significant difference was found between the physical fitness and combined groups, as their p-value was 1.000. The physical fitness group had a significantly higher adjusted post-test mean score for cardiovascular endurance compared to the control, yoga, and combined groups.

**Table 5: Percentage of Relative Changes in Treatment groups with respect to Control**

| Control | Physical Fitness | Yoga     | Combined |
|---------|------------------|----------|----------|
|         | -17.942%         | -11.410% | -15.961% |

**Interpretation:** Table 5 shows the percentage change in cardiovascular endurance among college students. The physical fitness group experienced the highest improvement, with a change of -17.942%, followed by the combined group at -15.961%, and the yoga group at -11.410%. This indicates that the physical fitness group had the most significant improvement in cardiovascular endurance compared to the other two groups.

## DISCUSSION ON FINDINGS

The study shows that Physical Fitness, Yoga, and Combined protocols significantly improved cardiovascular endurance in college students, with all treatment groups outperforming the Control group, which received no intervention.

- **Physical Fitness Protocol:** The Physical Fitness Protocol enhances cardiovascular endurance through high-intensity, repetitive exercises that stress the cardiovascular system. These activities improve heart rate, oxygen transport, and overall cardiovascular efficiency, enabling better endurance. Studies, including Zaki et al. (2023) and Khattak et al. (2020), support that moderate-to-high-intensity exercises and circuit training significantly improve cardiovascular health and endurance in adolescents and college students.
- **Yoga Protocol:** Yoga improves cardiovascular endurance by enhancing flexibility, core strength, and respiratory efficiency. Poses that stretch muscles and regulate breathing boost

circulation and lung function, aiding oxygen delivery. Additionally, yoga reduces stress, improving cardiovascular responses over time. The similar studies aligned with Mognet and Mesfin (2022) found that yoga significantly improved cardiovascular endurance in U-17 male football participants. Similarly,

Mahaja et al. (2019) reported that yoga enhances cardiorespiratory efficiency, general health, and physical fitness in healthy individuals.

- **Combined Protocol:** The combined approach blends high-intensity cardiovascular exercises with yoga's flexibility and balance, promoting balanced development of both cardiovascular and muscular endurance. While effective, its impact on cardiovascular endurance is slightly less intense than the pure Physical Fitness protocol. Bhaskar et al. (2019) found that aerobic training and yoga improved cardio-respiratory endurance in obese male college students, with better results from aerobic training. Rameshkumar et al. (2018) showed that combining yoga and resistance training enhanced cardio-respiratory endurance and body composition in obese boys. Satyavati and Hoovanna (2017) found that yoga and physical workouts improved cardiovascular endurance in secondary school students.

## SUMMARY, CONCLUSION AND RECOMMENDATION:

**SUMMARY:** The study highlights the effectiveness of targeted fitness interventions on cardiovascular endurance. The Physical Fitness protocol showed the greatest improvements, while Yoga provided a sustainable approach, and the Combined protocol offered a balanced advantage by blending both high-intensity and restorative practices.

### CONCLUSION:

The study concluded that the Fit India Fitness Protocol significantly improved cardiovascular endurance among college students. The Physical Fitness group showed the highest improvement, followed by the Combined and Yoga groups, whereas the Control group showed no significant improvement. The findings indicate that regular participation in structured physical fitness and yoga programs effectively enhances cardiovascular health, physical fitness, and overall well-being. Therefore, educational institutions are encouraged to implement Fit India-based physical fitness and yoga programs to promote a healthy and active lifestyle among students.

### RECOMMENDATION:

Educational institutions should offer structured fitness, yoga, or combined programs based on students' goals to enhance cardiovascular endurance. Yoga programs should be promoted for gradual improvements in endurance and mental well-being.

## FUTURE RESEARCH DIRECTIONS

- Conduct long-term studies to assess the lasting effects of physical fitness, yoga, and combined protocols on cardiovascular endurance.
- Explore the impact of these protocols on other fitness and physiological parameters, using wearable devices and apps to track progress and improve engagement

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