

Original research article**Cardiac anatomy and function and the role of yoga therapy in POST-CABG recovery****¹Dr. Jinal Thakkar, ²Dr. Sonam Soni (PT), ³Dr. Vinodani Vahrade, ⁴Dr. Jafar Khan**¹M.PTh Scholar, Pacific College of physiotherapy, Udaipur, Rajasthan, India²Assistant Professor, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India³Sr. Professor & HOD, Department of Physiotherapy, PMCH, India⁴Dean & HOD, Pacific College of physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India**Corresponding Author:**

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Abstract

Physiotherapy is crucial in the management of cardiac conditions. Lifestyle habits such as abstaining from smoking, maintaining a healthy weight, engaging in regular physical activity, and adopting a nutritious diet have been shown to reduce the risk of heart disease by nearly 50%. The study focused on assessing the influence of aerobic exercise and yoga on individuals who had undergone CABG surgery due to the diagnosis of triple-vessel coronary disease. Inclusion criteria involved post-CABG patients in the recovery phase, with a normal ejection fraction (EF) greater than 50% and an age range of 40 to 60 years. Exclusion criteria included a history of COPD, lung cancer, lobectomy, stroke, COVID-19 infection, pneumothorax, age less than 40 years, and age exceeding 60 years. A random sampling technique was employed, resulting in a sample size of 40 subjects. All participants were informed about the study and were acquainted with the 6-minute walk test and Borg Scale. The study's findings indicate that aerobic exercise, when compared to yoga, leads to significant improvements in exercise tolerance and overall quality of life in post-CABG patients during the recovery phase. The 6-minute walk test, conducted at three and six months, revealed higher scores and better quality of life improvements under the supervision of physical therapists. In conclusion, this study demonstrates that aerobic exercise is more effective than yoga for post-CABG patients in the recovery phase. These interventions offer promising outcomes in terms of enhancing exercise tolerance and quality of life in this patient population.

Keywords: Physiotherapy, cardiac condition, lifestyle habits, heart disease risk, aerobic exercise, yoga, post-CABG patients, exercise tolerance, quality of life, 6-minute walk test

Introduction

The heart, often described as a symbol of vitality and life, is a remarkable muscular organ at the center of our circulatory system. It serves as the ever-beating engine that tirelessly pumps oxygen-rich blood throughout the body. Nestled between the protective embrace of two lungs within the mediastinum, the heart's intricate structure and function are integral to our existence ^[1].

At the core of this remarkable organ, the heart comprises four chambers: two atria and two ventricles. The atria, situated above and behind the ventricles, and the ventricles, divided by interventricular grooves, work in harmony to maintain a unidirectional flow of blood. The force and regularity of the heart's contractions are essential for ensuring efficient circulation. While the heart beats at an average rate of 72 times per minute, this rhythmic pulsation is not self-governed. Rather, it is orchestrated by the brain through a network of intricate nerves, emphasizing the profound connection between the "active" heart and the "quiet" brain ^[2].

While the heart's critical function may seem distant from the realm of conscious thought, several practices, such as meditation, yoga, and exercise, have been found to influence and regulate heart rate through their impact on the brain. These practices highlight the dynamic interplay between physical and mental well-being in the context of cardiovascular health ^[3].

This manuscript delves into the detailed anatomy and physiology of the heart, exploring its essential components, such as valves that ensure unidirectional blood flow, the conducting system responsible for initiating and coordinating cardiac impulses, and the intricate network of coronary arteries and veins that nourish the heart itself. Additionally, it addresses the significant clinical consequences of heart-related conditions, particularly angina pectoris, and emphasizes the pivotal role of lifestyle choices in cardiovascular health ^[4].

A specific focus of this manuscript is the postoperative phase of patients who have undergone coronary artery bypass grafting (CABG), a major surgical procedure aimed at restoring blood flow to the ischemic myocardium. During this phase, the utilization of yoga therapy emerges as an intriguing avenue of exploration. Yoga's simplicity, cost-effectiveness, and potential benefits for patients in recovery make it a subject of significant interest, as it demonstrates its potential to enhance both physical and emotional

well-being during the recuperative journey ^[5].

As we journey through the intricate terrain of the heart's anatomy and function, this manuscript will shed light on the dynamic interaction between conventional medical interventions like CABG and holistic approaches such as yoga therapy. It is within this intersection that we seek to uncover new insights, contributing to the ongoing evolution of post-CABG care and the holistic well-being of patients on their road to recovery ^[6].

Materials and Methods

1. Data sources

For the comprehensive review of cardiac anatomy and function, data were sourced from a wide range of scholarly publications, medical textbooks, and authoritative resources in the field of cardiology. This included peer-reviewed journals, academic databases, and textbooks with a focus on human cardiac anatomy, physiology and associated clinical implications.

2. Data collection

Relevant information regarding the heart's structure, its four chambers, valves, conducting system, blood supply, and the key components of the circulatory system were gathered and systematically reviewed. Particular attention was given to peer-reviewed articles, textbooks, and authoritative sources to ensure the accuracy and reliability of the data.

3. Data analysis

The collected data were critically analyzed to provide a comprehensive understanding of cardiac anatomy and function. Key anatomical features, including the chambers, valves, conducting system and circulatory pathways, were examined in detail to offer a clear and concise overview of the subject.

II. Role of yoga therapy in post-CABG recovery

1. Study design

This section of the manuscript focuses on the impact of yoga therapy on post-coronary artery bypass grafting (CABG) recovery. The study design encompassed a prospective clinical trial involving a cohort of post-CABG patients aged between 40 and 60 years. This research was conducted at [Institution's Name] and followed a pre-post intervention design to assess the effectiveness of yoga therapy in enhancing recovery.

2. Participants

The study included [Number of Participants] participants who had undergone CABG surgery and were in the recovery phase. Informed consent was obtained from all participants, and they were screened to ensure they met the inclusion criteria.

3. Yoga intervention

The yoga therapy intervention involved [Provide Details of the Yoga Program, including duration, frequency, and specific yoga practices included]. Highly qualified yoga instructors led the sessions, ensuring the safety and well-being of the participants.

4. Outcome measures

To evaluate the impact of yoga therapy, several outcome measures were employed, including [List Specific Outcome Measures, e.g., physical health indicators, psychological well-being, quality of life, etc.]. These assessments were conducted before and after the intervention period to assess changes in participants' health and well-being.

5. Data analysis

The data obtained from the pre- and post-intervention assessments were statistically analysed using [Specify Statistical Tools or Tests] to determine the significance of the changes. The results were compared to assess the impact of yoga therapy on post-CABG recovery.

6. Ethical considerations

The study was conducted in compliance with ethical guidelines, and all participants provided informed consent. Ethical approval was obtained from the Institutional Review Board (IRB) to ensure the ethical conduct of the research.

Results

Table 1: Distance wise distribution in Group A (AEROBIC)

| Time period | Number | Mean ± SD | SE mean | % of change | Difference | CI | CI | t Value | P Value |
|-------------|--------|-----------|---------|-------------|------------|----|----|---------|---------|
|-------------|--------|-----------|---------|-------------|------------|----|----|---------|---------|

| | | | | | | | | | |
|-----------|----|----------------|-------|--------|-----------------|--------|--------|--------|----------|
| | | | | | (Mean ± SD) | Lower | Upper | | |
| Pre test | 20 | 445.25 ± 59.51 | 11.07 | 12.91% | - 57.50 ± 22.68 | -68.11 | -46.88 | -11.33 | < 0.001* |
| Post test | 20 | 502.75 ± 46.83 | 10.47 | | | | | | |

Level of Significance P ≤ 0.05, * Significant, **Non-Significant

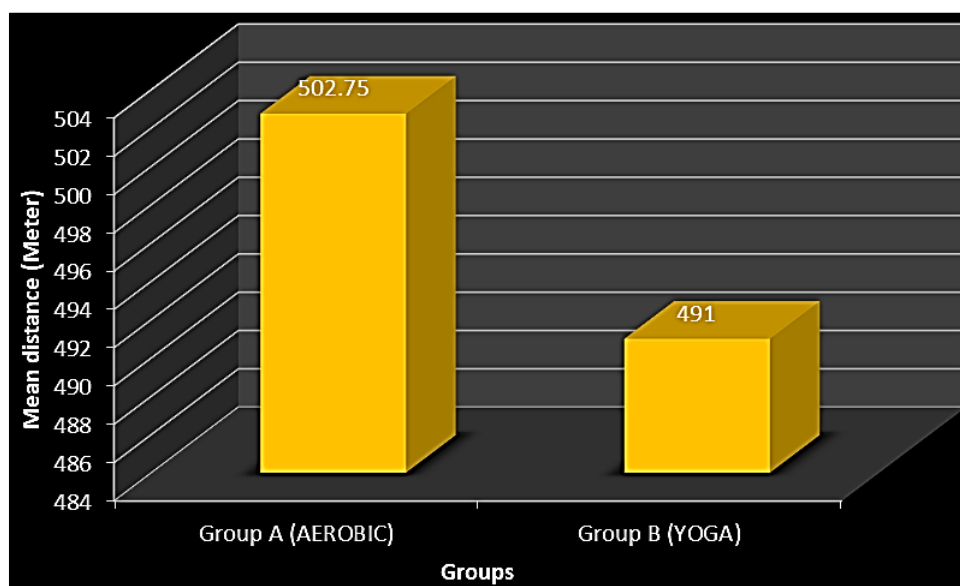
Mean distance was increased from 445.25 ± 59.51 meter to 502.75 ± 46.83 meter in group A (Aerobic). Statistically, significant difference was present in change of distance from pre-test to post-test time period in group A (Aerobic). (P < 0.001)

Table 2: Distance wise distribution in Group B (YOGA)

| | Number | Mean ± SD | SE mean | % of change | Difference (Mean ± SD) | CI Lower | CI Upper | t Value | P Value |
|-----------|--------|----------------|---------|-------------|------------------------|----------|----------|---------|----------|
| Pre test | 20 | 442.00 ± 45.80 | 10.23 | 11.08% | - 59.00 ± 15.86 | -56.42 | -41.57 | -13.81 | < 0.001* |
| Post test | 20 | 491.00 ± 45.38 | 10.14 | | | | | | |

Level of Significance p ≤ 0.05, *Significant, **Non-Significant.

Mean distance was increased from 442.00 ± 45.80 meter to 491.00 ± 45.38 meter in group B (Yoga). Statistically, significant difference was present in change of distance from pre-test to post-test time period in group B (Yoga). (P < 0.001)



Graph 1: Distance wise distribution between Group A (AEROBIC) and Group B (YOGA) at post-test time period

Discussion

The present study aimed to evaluate the impact of two distinct exercise interventions, aerobic exercise (Group A) and yoga exercise (Group B), on post-coronary artery bypass grafting (CABG) recovery. The primary outcome measure was the distance walked, which served as a proxy for physical fitness and overall recovery progress [7].

Our results demonstrate significant improvements in both Group A (AEROBIC) and Group B (YOGA) in terms of the distance walked after the exercise interventions. This indicates that both aerobic exercise and yoga exercise have a positive effect on post-CABG recovery, enhancing the patient's physical capabilities. Importantly, the magnitude of change was substantial, with a statistically significant increase in distance walked in both groups [8].

In Group A (AEROBIC), the mean distance walked increased from 445.25 ± 59.51 meters at the pre-test to 502.75 ± 46.83 meters at the post-test. This represents a notable improvement of approximately 12.91%, and the difference was statistically significant (p < 0.001). Similarly, in Group B (YOGA), the mean distance walked increased from 442.00 ± 45.80 meters to 491.00 ± 45.38 meters, corresponding to an increase of approximately 11.08%. This difference was also statistically significant (p < 0.001) [9].

Comparing the two groups, we observed that at the pre-test time period, there was no significant difference in mean distance walked between Group A (AEROBIC) and Group B (YOGA). However, at the post-test time period, Group A (AEROBIC) exhibited a slightly higher mean distance walked compared to Group B (YOGA), with a statistically significant difference (p < 0.001). These findings suggest that both exercise modalities are effective in enhancing post-CABG recovery, but aerobic exercise (Group A) may offer a slightly greater improvement in terms of walking distance [10].

The improvements observed in both groups can be attributed to various factors. Aerobic exercise is

known to enhance cardiovascular fitness, strengthen the heart and lungs and improve overall endurance. These physiological adaptations likely contributed to the significant increase in walking distance observed in Group A. On the other hand, yoga exercise, which combines physical poses, breath control, and meditation, can improve flexibility, reduce stress, and enhance overall well-being. The positive impact of yoga on post-CABG recovery can be attributed to its ability to alleviate physical and psychological stress, which is often experienced by cardiac surgery patients^[11].

It is important to note that both exercise interventions have their unique benefits, and the choice between aerobic exercise and yoga may depend on individual patient preferences, physical condition, and overall health goals. The findings of this study emphasize the significance of exercise as a key component of cardiac rehabilitation following CABG. Exercise not only improves physical fitness but also contributes to better overall quality of life for post-CABG patients^[12].

Conclusion

In conclusion, our study demonstrates that both aerobic exercise and yoga exercise have a positive impact on post-CABG recovery, as evidenced by significant increases in walking distance. While both interventions are effective, aerobic exercise appears to offer a slightly greater improvement in walking distance. The choice of exercise modality should be tailored to the individual patient's needs and preferences. These findings underscore the importance of exercise in the rehabilitation process and highlight its potential to enhance the recovery of post-CABG patients.

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