

Article

Evaluating The Impact Of Yoga Based Lifestyle Modification Therapy On Anxiety In Patients Undergoing Coronary Artery Bypass Grafting

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Abstract: **Introduction:** Background: Coronary Artery Bypass Grafting is the first-line therapy for multivessel and left main coronary artery disease providing enhanced cardiac function¹. Anxiety is a common reaction in patients awaiting a major cardiac surgery. Objective: The objective of the study was to evaluate the impact of Yoga based lifestyle modification therapy on anxiety in patients undergoing coronary artery bypass grafting. Methods: A quasi-experimental pretest-post-test control group design was used and consecutive sampling technique was employed to select 90 patients undergoing coronary artery bypass grafting in a tertiary care hospital. State-trait anxiety inventory was used for data collection. Data were analysed using descriptive statistics and independent t test. Results: The study enrolled 90 patients(45 in experimental group and 45 in control group), in which 64.4% of patients had state anxiety scores between 37 and 54 and 68.9% had trait anxiety scores between 37 and 54. There was no statistically significant difference in the mean pretest state anxiety scores between experimental group and control group, whereas in post-test, there was significantly low anxiety in experimental group as compared to control group. Conclusion: Yoga-based life style modification therapy was found to have a positive impact in reducing anxiety which may further improve health outcomes of patients after surgery.

Keywords: Coronary Artery Disease, Coronary Artery Bypass Grafting, Yoga-based life style modification therapy, Anxiety, State Trait Anxiety Inventory, health outcomes

AuthorContributions:¹Conceptualization, data curation, methodology, investigation, project administration, visualization, formal analysis, writing-original

²Conceptualization, methodology, resources. supervision, validation, writing-review & editing (Primary Author)

³Conceptualization, resources, supervision, validation. (Co author)

INTRODUCTION

Coronary Artery Disease is one of the major causes of morbidity and mortality across the globe. Coronary Artery Bypass Grafting (CABG) is the mainstay in the management of coronary artery disease, in which multiple vessels are involved.² According to recent estimates, 400,000 CABG surgeries are performed annually making it the commonest of all major surgeries.³ According to a recent statistics in India, approximately 190,000 CABG surgeries are performed annually.⁴ In this industrialized world, stress and anxiety can be the predominant behavioral risk factors that can lead to coronary artery disease along with other factors, and the subsequent major cardiac surgery Spielberger defined anxiety as a negative or threatening emotion that one feels generally, in the long term (trait anxiety), or in a specific situation that fluctuates over time (state anxiety)⁵. Anxiety may be caused by fear of death, changes in health status, no or little knowledge about medical and surgical interventions, stressful setting in the ICU, continuous monitoring by nurses, continuous sound of alarms in monitors, severe pain, anesthesia, recovery duration and lack of sleep⁶. Patients who are posted for a major cardiac surgery develop severe anxiety due to the procedures they have to undergo and uncertainty in its outcome. Preoperative anxiety is considered as a definitive predictor of postoperative outcome.⁷ In a study conducted on the impact of preoperative anxiety and education level on long term mortality after cardiac surgery, trait anxiety (STAI-T) scores and education level were linked to higher risk of mortality, during 7.5 years of follow up after cardiac surgery.

A study was conducted to find out the presence of clinically relevant anxiety and depression in 142 consecutive patients before and after coronary artery bypass grafting and evaluated their relationship to age. Hospital anxiety and depression scale was the instrument used to identify anxiety and depression 2 days before surgery and 10 days after surgery.

Thirty four percentage (34%) of patients were clinically anxious before and 24.7% after CABG, 25.8% were clinically depressed before and 17.5% after surgery. A significant correlation was identified between age and changes in anxiety (Spearman rho = -0.218; p = 0.03). The result indicated that, as the patient was more younger the larger was the difference between pre and postsurgical

anxiety scores. The result emphasizes that younger patients had a stronger decline in anxiety 10 days after surgery⁹.

Failing to manage anxiety impacts more than just emotional health- it can also affect surgical recovery, alter pain perception, and negatively influence long-term outcomes¹⁰. CABG itself cannot reduce mortality without a change in life style. Along with CABG and medications, life style modifications like diet, exercise and yogic relaxation can also be incorporated in a patient's life to prevent the occurrence of further problems. Yoga based interventions have been shown to be effective in reducing and managing anxiety.¹¹

Yoga is a mind-body intervention for attaining positive health. Yogic intervention has the capacity to modify cardiovascular risk factors. Among the different types of Yoga, Hatha Yoga is commonly practiced. Hatha Yoga comprises of stretching exercises, physical postures (Asanas), breath control (Pranayama) and concentration techniques (Meditation). The beneficial effects of yoga include; detoxification of the body, mitigate chronic fatigue, enhance endurance and improves function of organs and immune system.

Yoga is believed to be a valuable complementary intervention for cardiovascular conditions like coronary artery disease (CAD) and it augments recovery from coronary artery bypass grafting. Yoga based interventions are better than other conventional exercise based cardiac rehabilitation programmes as it cultivates mindfulness and reduces stress. The mindfulness component of yoga helps in regulating the parasympathetic nervous system. Sustained yoga practice helps in correcting underactivity of parasympathetic nervous system and also sympathetic dominance thereby reducing stress.¹²

Yoga is considered as a stress management strategy and a rehabilitation intervention of low impact, doesn't require any equipment, demands only minimal space, and is calming and relaxing which the patient can practice at his own pace. Results of research studies reported several neurohumoral benefits of yoga, such as reduces serum cortisol, catecholamine, and aldosterone.¹³

As a non-pharmacologic and safe modality, relaxation therapy with yoga can be used as an effective intervention

to reduce risk factors leading to further development of CAD, who have already undergone CABG by improving the physical and psychological status in these patients. No studies have been conducted in Kerala utilizing a yoga based cardiac rehabilitation intervention preoperatively to reduce the anxiety in a patient posted for coronary artery bypass grafting. Hence an experimental study was conducted in a tertiary care center in Kerala to find out the impact of yoga-based life style modification in reducing anxiety in patients undergoing CABG.

Materials and Methods

A quasi-experimental pretest post-test control group design was used. The study population comprised of patients diagnosed to have coronary artery disease and posted for coronary artery bypass grafting electively. A non-probability consecutive sampling technique was employed to recruit 90 patients diagnosed with Coronary Artery Disease who were scheduled to undergo Coronary Artery Bypass Grafting at the Government Medical College Hospital, Kottayam. Inclusion criteria include, patients diagnosed with Coronary Artery Disease and posted for elective CABG, patients diagnosed with Double Vessel Disease, Triple Vessel Disease (TVD) and Left Main Coronary Artery Disease(LMCA) with TVD by Coronary angiography and patients who are willing to participate in the study. Exclusion criteria include patients who are critically ill

with ejection fraction of less than 30%, patients planned for CABG with valve surgeries, patients undergoing emergency CABG and patients with a history of other debilitating systemic diseases and mental illness.

Data collection & follow up

The study was conducted in the Department of Cardiovascular and Thoracic Surgery at Government Medical College Hospital, Kottayam, after obtaining ethical clearance from the Scientific Review Committee and the Institutional Ethics Committee of the Government College of Nursing, Kottayam, as well as getting Institutional Ethics Committee approval from Mahatma Gandhi University, Kottayam. The Institutional Ethics Committee approved the proposal on 22/05/2018 with IEC Ref. No. 138/2018. Recruitment of first patient in the study was done after registering the trial in Clinical Trials Registry of India. (CTRI Registration No. CTRI/2020/04/024642). Written informed consent was obtained from all participants to ensure voluntary and informed participation. Data collection involved the initial gathering of sociodemographic and clinical profiles, followed by the evaluation of anxiety using the State Trait Anxiety Inventory before providing yoga-based lifestyle modification therapy and after 1 month of CABG surgery, again anxiety is assessed to find out the impact of yoga based life style modification therapy on anxiety of patients undergoing coronary artery bypass grafting

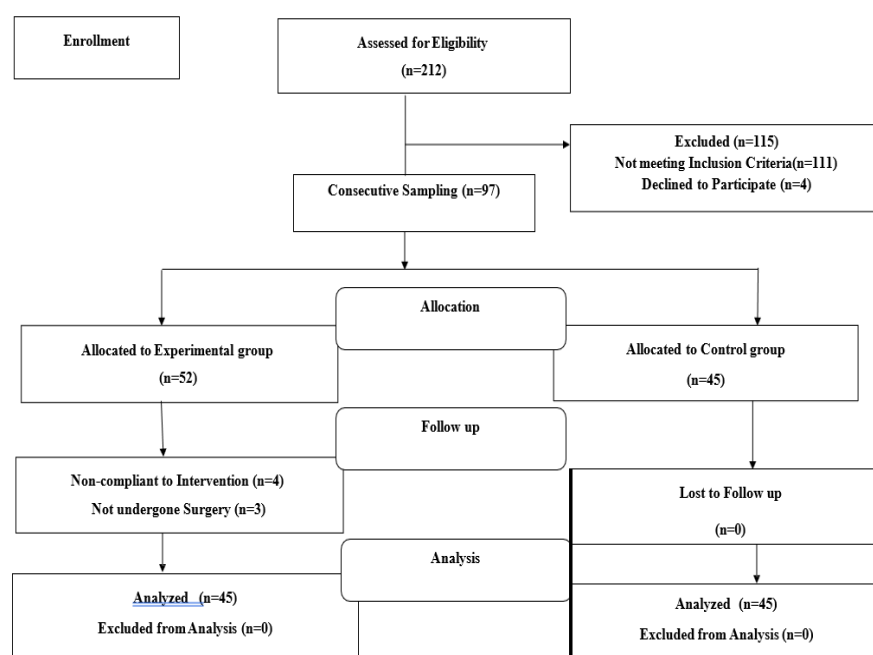


Figure 1: Consort diagram of Patient Screening and Allocation

Intervention

Yoga based lifestyle modification therapy was given, preoperatively 1 month before CABG in 3 sessions at 1 week interval. Return demonstrations of Yogasanas were done in the subsequent sessions and the investigator observed the patient, with timely corrections individually. After completion of the first session, an information booklet describing yogasanas, breathing exercises, mudras, meditation and diet were provided to participants. Audio and video recording of Yogasanas were also given to the study participants. A diary was given to patients in the experimental group for recording yogasanas which they have performed daily. Telephonic reinforcement was also given to study participants. Post-test was conducted in the experimental group and control group using State Trait Anxiety Inventory, 1 month after CABG.

Yoga based life style modification therapy involves simple asanas and specific techniques which a cardiac patient can perform which includes, loosening exercises and basic yoga poses, focusing more on shavasana which provides relaxation, breathing techniques like deep breathing, alternate nostril breathing, bhramari pranayama and meditation, taught preoperatively by the investigator in 3 sessions in small groups (5-7 patients). Three sessions of 1 hour duration were given to each group at an interval of 1week. Patients were advised to practice it daily for 45minutes for a period of 1 month. During each session, the participants were taught about the lifestyle modifications based on yoga including diet - diet which prioritizes fresh fruits and vegetables, depending upon their diabetic status, timely intake of food in limited amount not more than half full of stomach, positive thinking, maintaining happiness, cleanliness, avoiding late nights to sleep and getting minimum 6 hours of sleep

Statistical Analysis

Categorical and quantitative variables were expressed as frequency (percentage) and mean $\pm$ SD respectively. Descriptive statistics such as mean $\pm$ SD, Median with Inter Quartile Range, minimum and maximum were used to describe anxiety score. Box plot was used for the graphical presentation of descriptive summary statistics such as minimum, first quartile, median, third quartile, and maximum. Independent t test was used to compare anxiety scores between treatment groups. For all statistical interpretations, $p < 0.05$ was considered the threshold for statistical significance. Statistical analyses were performed by using a statistical software package SPSS, version 20.0.

Results

Sample characteristics

The study enrolled 90 (69 Males and 21 Females) participants and 45 patients were allocated in experimental group and 45 in control group. Majority of samples were ≤ 60 years (Experimental group = 53.3% and control group= 64.4%) and their mean age was 58.45 ± 7.13 . Majority were males (Experimental group = 68.9% and Control group = 84.4%) and 64.4% of patients in both experimental and control group were having an angiogram diagnosis of triple vessel disease. Homogeneity of socio personal and clinical variables between the experimental and control group were established using Chi square test and Fisher exact test. Based on tables 1 and 2, the two groups were homogenous with respect to sociodemographic and clinical variables except education, history of chest pain in the preoperative period and left ventricular function. There was no history of chest pain in the preoperative period for 68.9% of patients in the control group and 44.4% of patients in the experimental group. Regarding Left Ventricular (LV) function, 84.4% of patients in the control group had

good LV function where as 62.2% of patients in the control group had good LV function. The chi square value shows that there is a statistically significant difference between experimental and control group at $p = 0.05$ level. But this pre-interventional state is favourable for control group.

Homogeneity of socio personal and clinical variables of patients undergoing Coronary Artery Bypass Grafting selected in experimental and control group

Table 1 Comparison of Homogeneity of socio personal and clinical variables of patients undergoing Coronary Artery Bypass Grafting selected in experimental and control group

Variables		Experimental group (n=45)		Control group (n=45)		χ^2	p
		Frequency	Percentage	Frequency	Percentage		
Age	≤ 60	24	53.3	29	64.4	1.15	0.284
	> 60	21	46.7	16	35.6		

Gender	Male	31	68.9	38	84.4	3.04	0.081
	Female	14	31.1	7	15.6		
Formal Education	Up to Pre degree	20	44.4	11	24.4	3.99*	0.046
	Degree and above	25	55.6	34	75.6		
Type of work	Sedentary worker	15	33.3	11	24.4	0.87	0.352
	Moderate/Heavy worker	30	66.7	34	75.6		
Dietary habits	Vegetarian	7	15.6	5	11.1	0.38	0.535
	Mixed diet	38	84.4	40	88.9		
Type of family	Nuclear	37	82.2	40	88.9	0.81	0.368
	Joint/Extended	8	17.8	5	11.1		
Residence	Urban	39	86.7	38	84.4	0.09	0.764
	Rural	6	13.3	7	15.6		
Unhealthy habits	No	33	73.3	26	57.8	2.41	0.120
	Yes	12	26.7	19	42.2		

Family History of Cardiac Disease	Yes	21	46.7	18	40.0	0.41	0.523
	No	24	53.3	27	60.0		
Duration of diagnosis of CAD	Less than 1 year	25	55.6	32	71.1	2.34	0.126
	More than 1 year	20	44.4	13	28.9		
# Treatment for CAD	Regular	41	91.1	42	93.3	-	0.500
	Irregular	4	8.9	3	6.7		

Fisher Exact Test *: - Significant at 0.05 level

Table 1 depicts that there is a statistically significant difference between experimental group and control group with respect to formal education, where the Chi square value is 3.99 which is significant at 0.05 level. Considering education, it is favourable for patients selected in the control group. Education is higher in control group when compared to experimental group.

With regard to patients, those selected in experimental and control group were homogenous with respect to sociodemographic variables such as age, gender, type of work, dietary habits, type of family, residence, unhealthy habits, family history of cardiac disease, duration of diagnosis of CAD and treatment for CAD.

Table 2 Comparison of Homogeneity of Clinical variables of patients undergoing Coronary Artery Bypass Grafting selected in experimental and control group

Clinical variables		Experimental group (n=45)		Control group (n=45)		χ ²	p	
		Frequency	Percentage	Frequency	Percentage			
Angiogram diagnosis	Double vessel disease	8	17.8	5	11.1	1.17	0.558	
	Triple vessel disease	29	64.4	29	64.4			
	LMCA + TVD	8	17.8	11	24.4			
Duration of treatment	Less than 1 year	28	62.2	34	75.6	0.34	0.561	
	More than 1 years	17	37.8	11	24.4			
Body mass index	Normal	29	64.4	29	64.4	1.87	0.172	
	Over weight/Obese	16	35.6	16	35.6			
Co morbidities	Nil /one co morbidity	23	51.1	18	40.0	0	1.000	
	2 or more co morbidity	22	48.9	27	60.0			
Duration of smoking	≤20 years	12	57.1	9	50.0	1.12	0.290	
	>20 years	9	42.9	9	50.0			
Smoking Status	Smoker	24	53.3	19	42.2	1.11	0.291	
	Non smoker	21	46.7	26	57.8			
Pattern of sleep	Sound sleep	23	51.1	23	51.1	0	1.000	
	Disturbed sleep	22	48.9	22	48.9			
Bowel habits	Constipated	6	13.3	7	15.6	0.09	0.764	
	Regular/Normal	39	86.7	38	84.4			
Pattern of Exercise	Nil	16	35.6	23	51.1	2.22	0.136	
	Regular/Occasional	29	64.4	22	48.9			
History of chest pain in Preoperative period	Yes	25	55.6	14	31.1	5.48*	0.019	
	No	20	44.4	31	68.9			
Echo: LV function	Good LV	38	84.4	36	80	0.304	0.58	
	Mild to Moderate LV Dysfunction	7	15.6	9	20			

*: - Significant at 0.05 level

In table 2 we are comparing the clinical variables of patients in the experimental and control group. All these parameters are homogenous with respect to patients selected in the experimental and control group. Table reveals that there is no statistically significant difference between the control and experimental group with respect to the clinical variables, angiogram diagnosis, duration of treatment, body mass index, co morbidities, duration of smoking, smoking status, pattern of sleep, bowel habits, pattern of exercise and LV Function. The chi square value shows that there is significant difference in history of chest pain between experimental group and control group. In the control group, there is no history of chest pain in the preoperative period for 68.9% of patients, whereas 44.4% of patients in the experimental group had no history of chest pain in the preoperative period. History of chest pain is good in the control group than experimental group. This pre interventional condition is not favorable to the intervention in the experimental group. It is favorable for control group only. This means that history of chest pain in the preoperative period had no influence on intervention.

State and trait Anxiety of patients undergoing Coronary Artery Bypass Grafting

The State-trait anxiety inventory is considered as a gold standard in anxiety assessment. Anxiety is assessed as a personality trait in Trait anxiety and as a situational state in State anxiety. In this study, the state and trait anxiety of patients undergoing CABG were figured out using State trait anxiety inventory. The t value of post test mean scores of state and trait anxiety reflects that there is a statistically significant difference between the experimental group and control group, that is the experimental group manifesting low scores of anxiety compared to control group. Hence it is understood that yoga-based life style modification therapy was effective in reducing both state and trait anxiety in experimental group.

Table 3 Frequency distribution and percentage of State and Trait Anxiety of patients undergoing Coronary Artery Bypass Grafting

State and Trait Anxiety		Frequency	Percentage
State anxiety	0 - 18	1	1.1
	19 - 36	23	25.6
	37 - 54	58	64.4
	55 - 72	8	8.9
Trait anxiety	19 - 36	22	24.4
	37 - 54	62	68.9
	55 - 72	6	6.7

Table 3 analyses the state and trait anxiety of patients with coronary artery disease undergoing CABG, in which the score ranges from 0-72 in both scales. As the score increases, anxiety also increases. Table 3 depicts that 64.4% of patients had state anxiety scores within the range of 37-54 and 8.9% had very high state anxiety scores from 55-72. Considering trait anxiety, 68.9% of patients had trait anxiety scores within the range of 37-54 and 6.7% of patients had very high trait anxiety scores within the range of 55-72.

Table 4 Mean, SD, Median, Minimum and Maximum of State and Trait anxiety scores of patients undergoing CABG.

State & Trait anxiety	Mean±SD	Median(IQR)	Minimum	Maximum
State anxiety	42.9±9.8	44.5(35.75-50)	18.0	69.0
Trait anxiety	42.4±8.9	43(36.75-49)	21.0	66.0

Table 4 shows that the mean state anxiety score of patients undergoing CABG was 42.9 with a standard deviation of 9.8 and the values ranged from 18 to 69. The mean trait anxiety scores of patients with CAD undergoing CABG was 42.4, with a standard deviation of 8.9 and the scores ranged from 21 to 66.

Fig :1 Boxplot showing the descriptive statistics regarding State and Trait anxiety.

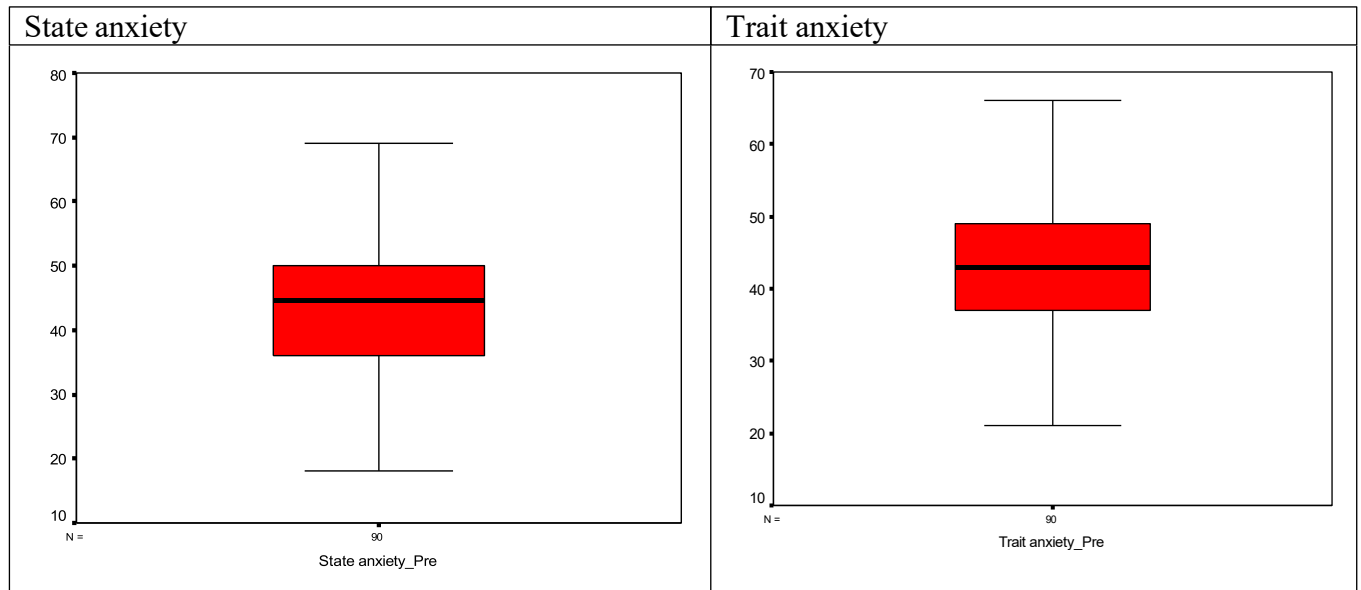


Figure:1 shows that the median interquartile range of state anxiety was 44.5 where Q1 is 35.75 and Q3 is 50 with a minimum and maximum value of 18 and 69 respectively. Regarding trait anxiety, the median interquartile range was 43, where Q1 is 36.75 and Q3 is 49, having a minimum and maximum value of 21 and 66 respectively. Effectiveness of Yoga based lifestyle modification therapy on anxiety of patients undergoing Coronary Artery Bypass Grafting.

Table 5 Distribution of level of pre and post intervention state anxiety among patients undergoing Coronary Artery Bypass Grafting

State anxiety		Experimental group (n=45)		Control group (n=45)	
		Frequency	Percentage	Frequency	Percentage
Pre	0 - 18	1	2.2	0	0.0
	19 - 36	13	28.9	10	22.2
	37 - 54	29	64.4	29	64.4
	55 - 72	2	4.4	6	13.3
Post	0 - 18	1	2.2	0	0.0
	19 - 36	30	66.7	13	28.9
	37 - 54	14	31.1	32	71.1

Table 5 shows that the preintervention state anxiety for 64.4% of patients ranges between 37- 54 for both experimental and control group. The preintervention state anxiety range was 55- 72 for 4.4% of patients in the experimental group and 13.3% of patients in the control group. The post test score ranges between 19-36 for 66.7% of patients in the experimental group and 28.9% in the control group. Only 31.1% of patients had post-test state anxiety score of 37-54 in the experimental group, whereas in the control group 71.1% had post-test state anxiety score of 37-54.

Table 6: Comparison of pre and post intervention state anxiety among patients undergoing Coronary Artery Bypass Grafting between experimental and control group

State anxiety	Experimental group (n=45)			Control group			t	P
	Mean	SD	N	Mean	SD	N		
Pre	40.9	10.0	45	44.8	9.1	45	1.94	0.055
Post	34.2	7.4	45	42.7	8.7	45	4.97	p<0.01

From table 6, it is clear that the pretest mean score of state anxiety among patients undergoing CABG was 40.9 with a standard deviation of 10.0 in the experimental group and in the control group, mean pretest state anxiety score was 44.8, with a standard deviation of 9.1. Hence there is no significant difference at pretest level. The post-test mean score of state anxiety in the experimental group was 34.2 with a standard deviation of 7.4, where as in the control group, the post-test mean score was 42.7 with a standard deviation of 8.7. The t value of pretest mean scores of state anxiety was 1.94, which is not significant at 0.05

level. Hence the two groups are comparable. The t value of post-test mean scores of state anxiety was 4.97, which is significant at $p < 0.01$. Hence it is understood that there is no statistically significant difference in the mean pretest state anxiety whereas there is significantly low anxiety in experimental group as compared to control group. So the intervention is found effective in reducing the state anxiety.

Table 7: Distribution of level of pre and post intervention Trait anxiety among patients undergoing Coronary Artery Bypass Grafting

Trait anxiety		Experimental group (n=40)		Control group (n=40)	
		Frequency	Percentage	Frequency	Percentage
Pre	19 - 36	13	28.9	9	20.0
	37 - 54	28	62.2	34	75.6
	55 - 72	4	8.9	2	4.4
Post	19 - 36	24	53.3	13	28.9
	37 - 54	21	46.7	31	68.9
	55 - 72	0	0.0	1	2.2

Table 7 reveals that the preintervention trait anxiety for 62.2% of patients ranges between 37- 54 for experimental group and in control group 75.6% of patients were in that range. The preintervention trait anxiety range was 55-72 for 8.9% of patients in the experimental group and 4.4% of patients in the control group. The post-test trait anxiety score ranges between 19- 36 for 53.3% of patients in the experimental group and 28.9% in the control group. Only 46.7% of patients had post-test trait anxiety score of 37-54 in the experimental group, whereas in the control group 68.9% had post-test trait anxiety score of 37-54

Table 8: Comparison of pre and post intervention Trait anxiety among patients undergoing Coronary Artery Bypass Grafting between experimental and control group

Trait anxiety	Experimental group (n=45)			Control group (n=45)			t	P
	Mean	SD	N	Mean	SD	N		
Pre	42.3	10.0	45	42.5	7.8	45	0.07	0.944
Post	36.1	8.4	45	40.6	7.3	45	2.74**	0.007

**:- Significant at 0.01 level

Table 8 depicts that the pretest mean score of trait anxiety among patients undergoing CABG was 42.3 with a standard deviation of 10.0 in the experimental group and in the control group, mean pretest trait anxiety score was 42.5, with a standard deviation of 7.8. The t value of pretest mean scores of trait anxiety was 0.07 which was not significant. The post- test mean score of trait anxiety in the experimental group was 36.1 with a standard deviation of 8.4 and in the control group, the post-test mean score was 40.6 with a standard deviation of 7.3. The 't' value of post-test mean scores of trait anxiety was 2.74, which is significant at 0.01 level. Hence it is understood that there is a statistically significant difference in the mean post-test trait anxiety scores between experimental group and the control group. So it is clear that the intervention was effective in reducing the trait anxiety among experimental group.

Discussion

The study aimed to evaluate the state & trait anxiety in patients with coronary artery disease undergoing CABG and evaluated the effectiveness of yoga-based lifestyle modification therapy in reducing anxiety of patients undergoing CABG. Several studies reported that increased preoperative anxiety adversely affects postoperative recovery. In this study pre- interventional anxiety was assessed when the patient is scheduled for coronary artery bypass grafting that is, when they are aware of the first time that he/she needs a major cardiac surgery. After assessment of presurgical anxiety, first session of yoga-based lifestyle modification therapy was done to the experimental group. Then again at weekly intervals, 2 more sessions were given. Yoga-based life style modification therapy was initiated preoperatively 1 month before surgery

and patients were entrusted to practice it daily and maintain a diary of record. Regular follow up and monitoring were done during the intervention period and the state and trait anxiety of both experimental and control group were assessed post operatively 1 month after CABG

In this study majority (82.2%) of patients were aged between 51-70 years. The incidence of female patients undergoing surgery was 23.3%. Angiogram diagnosis 64.4% of patients in this study was Triple Vessel Disease. Diabetes Mellitus was found in 62.2% of patients. The results are consistent with a retrospective analysis on demographic profile, clinical characteristics and outcomes of patients undergoing coronary artery bypass grafting of 4024 patients in which mean age of the patient population was 57 ± 9.5 years, only 12.6% were females, diabetes mellitus as a comorbidity was

present in 58.4% of patients, 66.4% of patients were having Triple Vessel Disease¹⁴.

The pretest mean score of state anxiety was 40.9 ± 10.0 and the post-test mean score of state anxiety was 34.2 ± 7.2 in the experimental group. In the control group, the pretest mean score of state anxiety was 44.8 ± 9.1 and the post-test mean score of state anxiety was 42.7 ± 8.7 . The t value of pretest mean scores of state anxiety was 1.94, which is not significant at 0.05 level. The t value of post-test mean scores of state anxiety was 4.97, which is significant at $p < 0.01$. Hence it is understood that there is no statistically significant difference in the mean pretest state anxiety whereas there is significantly low posttest anxiety in experimental group as compared to control group. So the intervention is effective in reducing the state anxiety. When considering trait anxiety also, there was no statistically significant difference between the pretest scores of trait anxiety between the experimental group and control group, indicating that both groups were homogenous. When considering post-test trait anxiety scores, the experimental group had shown a statistically significant reduction in post-test trait anxiety score (pretest= 42.3 ± 10.0 , post-test= 36.1 ± 8.4) when compared to the control group (pretest= 42.5 ± 7.8 , post-test= 40.6 ± 7.3). The study results are congruent with a study conducted on 124 patients who underwent coronary artery bypass grafting which found out that mindfulness meditation was helpful in reducing anxiety and improving self-efficacy, gratitude and quality of life. In this study, anxiety was assessed using Hamilton Anxiety scale (HAMA) where the HAMA Scores were 15.25 ± 1.56 in the observation group whereas that in the control group, anxiety scores were 16.33 ± 1.85 .¹⁵ In a prospective randomized control trial which included 150 patients evaluated the effect of Raja-yoga meditation on modulating anxiety and cortisol level in patients undergoing elective CABG. Anxiety was measured using a visual analog scale 1-10 and serum cortisol level was measured on the day of surgery, 2nd and 5th day of surgery. The results of the study supported our study by stating that the patients who underwent Raja yoga meditation had statistically lower anxiety level on the 2nd and 5th post operative day. Patients who continued Raja yoga meditation practice had further decline in the anxiety level, which was found to be statistically significant. Hence mind body interventions had a significant role in reducing anxiety and modulating cortisol levels in a stressful major surgery like CABG.¹⁶

Clinical implications

This study is the first of its kind in Kerala, as it integrates Yoga based life style modification therapy in cardiac rehabilitation preoperatively. Many studies conducted in India were incorporating yoga in the post-operative rehabilitation protocol, usually 6 months after CABG. Patients often feel extremely anxious upon learning for the first time that, they need to undergo an open heart surgery. It would be very much useful if we can incorporate yoga based lifestyle modification in the preoperative period itself, as patients may be much receptive and can sustain the

effects of this intervention postoperatively also. Practicing yoga-based intervention preoperatively can improve the health outcomes and also make the patients more resilient.

Limitations

The sample size of the study is limited to 90. The study was done in a single centre. So large, multicentric studies can be conducted to enhance the prospects of generalization. Participants were recruited through non probability consecutive sampling and allocated to experimental and control group through a non-randomized approach. Simple and relaxing yogic practices like Shavasana could be continued postoperatively also and their effects can be assessed. Risk factors that may lead to anxiety are not assessed in the present study, which can be investigated further.

Conclusion

A great deal of anxiety is experienced by patients who first learn that they must undergo CABG, as it is a major cardiac surgery. Assessment of anxiety is crucial in a patient posted for CABG. The causes of anxiety may be fear of surgery, economic burden and also fear of outcome. Preoperative anxiety directly influences post operative recovery. Here comes the importance of cost-effective interventions like yoga which can be included as a routine cardiac rehabilitation programme.

Data Availability

The data sets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Author contributions

Primary Author and Corresponding Author: Conceptualization, data curation, methodology, investigation, project administration, visualization, formal analysis, writing-original draft.

Primary Author: Conceptualization, methodology, resources, supervision, validation, writing-review & editing.

Co author : Conceptualization, resources, supervision, validation.

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Conflict of interest

The authors declare no conflict of interest.

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