Original article:

Effect of shavasana in post CABG surgery patients during phase I of cardiac rehabilitation

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Abstract:

Background: Incidence of Coronary Artery Disease (CAD) and there of Coronary Artery Bypass Graft (CABG) surgery are increasing day by day. Presence of anxiety in post CABG surgery patients; which is noted frequently, is a major concern. The patho-chemical effects of anxiety, leads to delayed recovery period from the surgery and redevelopment of CAD in these patients. Shavasana is a yogic method for relaxation and it is proposed to reduce anxiety. It is important to assess the practical significance and the suitability of incorporating Shavasana into the early phase of cardiac rehabilitation programme after CABG surgery.

Method: Sixty subjects who had undergone coronary artery bypass grafting were randomly allocated into two treatment groups on post operative day 1; Group A i.e. control group which received usual phase I cardiac rehabilitation and Group B which received phase I Cardiac rehabilitation and Shavasana session for ten minutes once a day. This treatment was given for seven days after surgery.

Outcome measures used were Beck's Anxiety inventory and resting values of heart rate, blood pressure and respiratory rate taken on post operative days 1 and 7. The data was statistically analyzed using 't' tests

Results: Data analysis revealed significant reduction in level of anxiety, resting heart rate, blood pressure and respiratory rate (P<0.05) in experimental group when compared with control group.

Conclusion: These findings suggest that Shavasana is effective treatment adjunct with usual Phase I cardiac rehabilitation, in patient's undergone CABG surgery. Thus, it should be incorporated as component of cardiac rehabilitation in early post operative period.

Key words: Cardiac rehabilitation, anxiety, coronary artery bypass graft.

Introduction

Cardiovascular disease (CVD) is one of the non-communicable diseases and it has become a major public health problem in many countries. The prevalence of CVD reported in different studies showed that the prevalence of coronary artery disease has almost doubled in the rural areas and increased nine-fold in the urban populations, and that the rates are higher in South India compared to the north. The prevalence of CVD was approximately 10% between 25 and 64 years of age in most of the developed countries, which may be slightly higher in the United States and Northern Europe and lower in Southern Europe, Japan, and Australia [1]. Disease of coronary arteries is almost always due to atheroma and its complications, particularly thrombosis. The key risk

factors for development and progression of CVD can be non modifiable like old age, male gender, family history of CVD or it could be modifiable like dyslipidemia, hypertension, diabetes mellitus, smoking, alcohol, physical inactivity, haemostatic factors and psychosocial factors like anxiety, depression and type A behavior etc .

Coronary artery bypass graft (CABG) surgery is a frequently used cardiothoracic revascularization method to CVD. The primary goal of CABG surgery is to improve health status, including symptoms, functional status, and quality of life. Although many patients experience symptomatic and functional improvements after CABG, At 1 year after CABG, ≈34% of patients remain symptomatic with angina and 40% of patients have activity limitation.[3].

Jens-Holger A Krannich**,** Peter Weyers**,** Stefan Lueger et al in 2007 found out presence of anxiety in 24.7% patients(out of 142 study population) 10 days after CABG and significant positive correlation of anxiety with age and lesser reduction in anxiety with increasing age post surgery[4]. Zahra Esmaeeli Douki, Nazani Vaezzadeh,Soheila Shahmohammadi et al after finding presence of low level anxiety in 115 out of 187 patients undergone CABG and negative correlation of anxiety with physical functioning and mental health; thus concluded that identifying patients likely to experience anxiety after CABG and design specific interventions that predominantly focus on reducing patient's anxiety and improving their QOL[5]. Anxiety also manifests as an autonomic symptom that can exacerbate CAD symptoms.[6]Clinical manifestations of anxiety are referable to autonomic nervous system which commonly includes palpitation, shortness of breath, unsteadiness, giddiness, tremors etc. Physical examination reveals tachycardia, elevated blood pressure, increase in depth and frequency of respiration, exaggerated deep reflexes[7].

Findings have suggested that application of phase I cardiac rehabilitation intervention can reduce the anxiety level during hospitalization of patients undergoing CABG surgery[8].

Shavasana i.e., corpse pose is a relaxation technique in yoga. It is the yogic kriya that is claimed to have particular anti-stress effect. In Shavasana, as the position of the body is horizontal, relaxed & fully supported, no system of body is required to work against gravity. Thus, the flexors and extensors muscle groups can relax at the same time as there is no need to balance the body against gravity. Further, the person practicing shavasana remains inwardly alert but is less conscious of the external environment[9]. Shavasana practice has been shown to increase the level of gamma-aminobutyric acid, or GABA, a chemical in the brain that helps to regulate nerve activity. GABA activity is reduced in people with mood and anxiety disorders[10].

As a non-pharmaco therapeutic and safe modality, relaxation therapy with shavasana can be used as an effective therapy to reduce risk factors leading to further development of CAD in patients' who have already undergone CABG surgery by improving psychological status in these patients. Considering the lack of data about the effectiveness of Shavasana on level of anxiety and vital parameters that are physiological markers of anxiety in patients undergone coronary artery bypass surgery during phase I cardiac rehabilitation this study was performed.

Material and methods:

This study was a randomized control trial carried out in cardiac speciality hospital. Permission to carry out study was obtained from the institute's ethical committee. It was carried out on 60 subjects between age group of 40-70 years who had undergone elective CABG were included in the study. However, psychologically disturbed individuals, any acute musculoskeletal injury to the Patients, patients on

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mechanical ventilator for more than 24 hours post CABG, patients with altered sensorium or metabolic brain disease and medical illness like neoplasm, renal and endocrinal disease were excluded from the study.

The Previous experience of yoga practice was not taken into consideration. On first day after surgery, study was explained to the patient in the language which they understood best. A prior written consent was taken from each subject and the rights of the subjects were protected. They were then divided in two groups (Thirty patients in each group) based on randomization by chit method;Group A: Control Group- patients received only cardiac rehabilitation

Group B: Experimental Group- patients received cardiac rehabilitation & a shavasana session once a day for ten minutes.

Outcome measure assessement:

Pulse rate: Patients were instructed to rest in supine position for 10 minutes and then radial artery pulsations were counted for 60 seconds. Readings were noted.

Respiratory rate: After pulse rate assessment respiratory rate was noted by counting chest rise for 60 seconds. (Without making patient aware of his/her breathing pattern)

Blood pressure: After respiratory rate assessment blood pressure was assessed using sphygmomanometer at brachial artery.

Level of anxiety: was assessed using Beck's anxiety inventory[11] (BAI). It is a brief measure of anxiety with a focus on somatic symptoms of anxiety. Respondents indicated how much they have been bothered by each symptom at that time. Responses are rated on a 4-point scale and range from 0 (not at all) to 3 (severely). BAI is psychometrically sound with IC range from 0.92-0.94 and reliability is 0.75.

This data was used as baseline parameters in both treatment groups.

These were assessed on first and seventh post operative day.

For seven days of hospitalization, the subjects of Group A & B received conventional cardiac rehabilitation.

The phase I exercise prescription[12] included exercise having Frequency: 2 times a day; Intensity: resting heart rate (RHR) +20; Duration: 10 to 20 minutes each time; and Mode: range-of-motion exercises for bilateral upper and lower extremities as well as chest expansion exercises, incentive spirometer and secretion removal techniques were given every day and 1 flight of stairs on 6^{th} day of surgery.

While group B received an additional ten minutes session of shavasana after the morning session of Cardiac rehabilitation

For practicing shavasana, patient was in a supine position or in 20˚ propped up position as per patient's comfort on their bed. The bed was padded but firm. Arms and legs extended, arms at the side, and palms facing up[13]. (Fig: I)

Patients were instructed about the steps of Shavasana & asked to follow the guidelines of shavasana which they would hear through the audio tape prepared by experienced yoga practitionar. Patients were also instructed not to sleep during the session.

Sound of audio tape was adjusted according to patient's comfort.

The audio tape (in a clear voice) instructed step wise on the gradual relaxation for major systems in body, including the musculoskeletal and the viscera, from caudal to cephalic direction. The audio clip also spoke about the importance of the functioning of different organs in the body. Patients were then instructed to relax their mind and concentrate on their breathing pattern and to reduce the rate of breathing gradually. This session lasted for ten minutes at the end of which patients concentration was gradually brought back to surrounding environment.

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Figure I. patient performing shavasana in cardiac recovery

This session was done once a day till the patient was hospitalized. On post-op day seven, assessment was repeated as done on the first day for both the groups.

Statistical analysis:

SPSS Version 17 was used for analyzing data. Paired't' test was used to analyze pre and post treatment results of experimental group. Between the group results were compared using unpaired't' test.A probability level of 0.05 was considered as statistically significant and the confidence interval was set at 95%. Wilcoxon and Mann-Whiteny μ test were used for analyzing nonparametric data i.e. anxiety levels between and within the group respectively.

Subject(n)	n=60	
Gender	Males	Females
	48	12
Mean age+/- S.D.(in years)	59.16 +/- 13.7	

Result:

The study was carried out in mixed population of 60 subjects, 48 males and 12 females with mean age of 59.16 ± 13.7. There were no dropouts from the study. Perceived level of anxiety declined in both groups, although this improvement was significantly more in the group B (P<0.05) i.e. experimental group as compared to group A.

Baseline and post treatment values for outcome measures There was a significant decrease in resting values of pulse rate (P=0.000), systolic blood pressure (P=0.000), respiratory rate (P=0.000) in experimental group as compared to that in control group wherein reduction in resting values of pulse rate (P=0.003) systolic blood pressure (P=0.028) and respiratory rate (P=0.004) was less significant (table II).

Discussion:

Cardiac surgery is a triggering factor for specific emotional and physiological responses of a patient. In spite of positive somatic effects of surgery, anxiety can persist or appear for the first time after the operation, worsening the patient's psychosocial functioning and quality of life. Present study was undertaken considering the dearth of relevant data for management of anxiety in patient's undergone CABG surgery in immediate post operative period. During the present study, we found that almost 50% of the study population had moderate level of anxiety on post operative day one. Among the various somatic symptoms assessed in the Beck's Anxiety Inventory, the most common were subjective sensations like difficulty in breathing, heart pounding and feeling of choking.

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Patients with anxiety have been shown consistently to have evidence of abnormalities in the balance of the autonomic nervous system, characterized by sympathetic nervous system upregulation, with excessive catecholamine production. Furthermore, impaired vagal control, manifest as an impaired baroreflex response and a decrease in heart rate variability has been noted in patients with anxiety. Impairment of the baroreflex response and decreased HRV are each thought to be sensitive markers for abnormalities in autonomic cardiovascular regulation and are independent risk factors for CAD. Additionally, patients with anxiety and CAD often exhibit an exaggerated systemic response to stress, characterized by an abnormally increased production of catecholamines, which can result in increased myocardial oxygen demand due to elevations in heart rate, blood pressure, and the rate of ventricular contraction[14].

Parameters	**Experimental Group**			**Control Group**		
	Mean±S.D.		***P* Value**	**Mean±S.D.**		***P* Value**
	Baseline values	**Post treatment values**		**Baseline values**	**Post treatment values**	
Pulse Rate	104.4±12.9	82.3±8.33	0.000	100±12.7	91.5±9.53	0.003
Systolic Blood Pressure	136.76±14.5	119.46±9.08	0.000	136±14.42	132±14.96	0.028
Diastolic blood pressure	71.13±10.23	74.36±6.31	0.099	70.50±13.3	79.26±12.18	0.004
Respiratory Rate	29.06±4.89	20±4.10	0.000	28.5±5.89	23.5±4.95	0.004
Anxiety score	15±5	4	0.000	15	11	0.005

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This study demonstrated highly significant effects of shavasana when given along with usual phase- I exercise training on reduction of anxiety scores and reducing resting values of physiological markers of anxiety.

Evidence suggests the benefits of cardiac rehabilitation and exercise training programs, markedly improve overall coronary risk in the secondary prevention of coronary artery disease[8]. Even in present study control group showed reduction in anxiety level, heart rate, respiratory rate and blood pressure but reduction was more significant in experimental group($p<0.05$) who did shavasana.

Shavasana is known to enhance one's ability to combat stressful situations. In the present study, as patients practiced shavasana their anxiety levels reduced significantly ($P<0.05$) when assessed with Beck's Anxiety Inventory on seventh day of surgery.

Angela Neves et al[15] in their study on relaxation therapy with cardiac rehabilitation have quoted the mechanism for stress reduction, which could be a better self-regulation. Patients doing relaxation therapy may become more aware of their capability to cope with environmental demands and, as a result, perceived less stress. Moreover, relaxation therapy induces a state of extensive muscular relaxation, which promotes a sense of serenity.

The possible mechanism could be that; persons practicing Shavasana are able to combat anxiety as it results in a better balance in their sympathetic and parasympathetic nervous system[16].

In shavasana, as the position of body is horizontal and relaxed, no system of body is required to work against gravity. Thus, flexor and extensor muscles can relax at the same time as there is no need to balance the body against gravity. This reduces frequency and intensity of proprioceptive and viscероceptive impulses[17]. Furthermore, the person practicing shavasana remains inwardly alert but is less conscious of the external environment. Therefore shavasana influences hypothalamus through continuous feedback of slow, rhythmic proprioceptive and viscероceptive impulses[8].

As noted earlier in the discussion; the most common findings encountered in the BAI were difficulty in breathing, heart pounding and feeling of choking which was significantly reduced post intervention in the experimental group. The underlying mechanism could be gradual reduction in heart rate and respiratory rate as patients practiced shavasana. This could be due to complete mind and body relaxation.

This study demonstrated reduction in heart rate significantly in experimental group as compared to that in control group; $p=0.000$. It is attributed to increased vagal tone and decreased sympathetic activity with practice of shavasana. When there is decrease in sympathetic activity, there is in turn reduction in catecholamine secretion which leads to vasodilation and hence improves circulation[17].

Regular yogic practices reduce basal metabolic rate and resting oxygen consumption. All these may be responsible for reduction in resting pulse rate and respiratory rate[18].

Three subjects from control group showed presence of arrhythmia during hospitalization period. Presence of anxiety could be one of the contributing factors for that. As impaired vagal control due to increased anxiety has arrhythmogenic effects[18].

In this study, results showed statistically significant reduction in resting systolic blood pressure after seven day shavasana practice in experimental group; $p=0.000$ than in Control group; $p=0.004$.

Also, there was statistically insignificant changes in resting diastolic blood pressure values of experimental group; $p=0.099$ as compared to control group; $p=0.004$. Thus, the resting diastolic blood pressure values of patients performing shavasana (experimental group) were unchanged and lower as that of patients who were given only cardiac

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rehabilitation (control group).This is because of increase in vagal tone that decreases the work load on heart leading to decrease in cardiac output and hence systolic blood pressure[14]. Shavasana influences hypothalamus through continuous feedback of slow, rhythmic proprioceptive and visceroceptive impulses from the body. Thus, shavsana practices alter the hypothalamic discharges leading to decrease in sympathetic tone and peripheral resistance and hence the diastolic blood pressure.

Sinha AN, Desh Deepak Vimal Singh Gusain et al in 2012 studied effect of shavasana after 6weeks and the observations of this study clearly suggest that the yogic exercise Shavasana influence the Autonomic Nervous system significantly. Shavasana lead to an increase in parasympathetic activity and reduce the heart rate[20].

In view of the rising psychosomatic and psychological problems – especially with respect to the patients' undergone CABG surgery this study suggests significant contribution of Shavasana on reducing its physiological effects.

The present study demonstrates that Shavasana has a positive effect on psychological stress and hemodynamic variables beyond that promoted by cardiac rehabilitation alone.

It can be concluded that in a person practicing shavasana, initially basal parasympathetic tone is enhanced. As the person continues to practice Shavasana, he/she is able to combat stress as it result in a better balance in their sympathetic and parasympathetic nervous system[20].

Thus, these findings support that inclusion of relaxation therapy i.e. shavasana as a relevant component of cardiac rehabilitation programs for CABG patients and the underlying cause for this reduction is positive effect of shavasana on cardiac autonomic function, decreasing autonomic arousal in part due to increased parasympathetic activity. The limitations of study were, the study population had other comorbid illnesses and patients practicing shavasana from before were not excluded, blinding was not done and patient's pre operative level of anxiety was not assessed.

Future study can be conducted to find out carry over effects of shavasana and gender wise differences in effects of shavasana during phase I of cardiac rehabilitation can be evaluated.

Conclusion:

Shavasana appear to be promising in reducing level of anxiety, heart rate, blood pressure and respiratory rate in patient's undergone CABG surgery during phase I of cardiac rehabilitation.

Clinical implication:

Shavasana can be included in phase I of cardiac rehabilitation as it has shown to have positive benefits in this phase.

It can be used as an effective lifestyle adjunct to medical treatment to reduce anxiety in patients undergone CABG.

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