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Effectiveness of music on anxiety and physiological parameters among pre-operative patients undergoing coronary artery bypass grafting, in a selected hospital, Bangalore

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Abstract
Introduction: In this 21st century, there are lots of changes such as the way people live, their lifestyle, and their food patterns. With these rapid changes among people, there is a change in the health pattern and an increase in incidence of cardiac disorders. Anxiety is common among all patients diagnosed with coronary artery disease (CAD), treatment and prognosis with the illness.
Methods: A quantitative research approach with the true experimental design was adopted among sixty patients who were selected by using simple random sampling technique. The collected data included the baseline variables, physiological parameters, and the Beck Anxiety Inventory Scale.
Results: In the experimental group, only 27% of the patients were having moderate anxiety and the remaining 73% were with severe anxiety before the intervention, whereas in the post-intervention, the anxiety level of 40% of them was with moderate anxiety and 60% with severe anxiety. The mean pre-interventional anxiety score was 38.1333, whereas mean post interventional anxiety score was 30.7667. The calculated t value (t=12.233) at $p<0.05$ was greater than the table value at 0.05 level of significance.

Keywords: Cardiac patients, anxiety, CABG, physiological parameters, music therapy

Introduction

Heart disease is now the world's leading causes of death, claiming 17.9 million [1] lives each year and is expected to raise more than 23.6 million by 2030 [2]. WHO has estimated that out more than 1 in 7 deaths in 2015 were caused by coronary artery disease (CAD) [2]. Coronary artery disease is caused by the narrowing of the large blood vessels that supply the heart with oxygen. In India, there has been a considerable increase in the number of heart disease cases over the past couple of decades [3]. CAD has both medical and surgical management. Surgical management includes Percutaneous Trans-Luminal Coronary Angioplasty (PTCA) and Coronary Artery Bypass Grafting (CABG) [4]. It is quite obvious that anxiety is common in the pre-operative period when patients are planned for cardiac surgery.

Preoperational anxiety can be described as an unpleasant state of tension or uneasiness that results from a patient's doubts or fears (from a vast array) before an operation [5]. Patients who are more anxious before CABG have more postoperative pain, [6] more readmissions, less long-term relief of cardiac signs and symptoms [7, 8] and poorer quality of life [7] and also increased poorer outcomes [9]. Furthermore, patients with more anxiety after the surgery have worse long-term psychological outcomes [10, 11]. Every patient reacts in their unique ways to surgery, all patients experience some degree of anxiety, worry over disability or death, and apprehension about the insecurity of their own and their family's future. [12]

When the patients become more anxious it leads to alteration in their physiological parameters. Changes in the physiological parameters such as increased respiratory rate, alteration in systolic and diastolic blood pressure and increase in the heart rate may lead to disturbance in the health of the individual. [13]

A survey among 240 patients waiting for CABG was measured for anxiety using the State-Trait Anxiety Inventory, and the Hospital Anxiety and Depression Scale. The study revealed

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that in finding half of the patients experienced anxiety, 5% had high anxiety. [14] A prospective, descriptive design with 172 CABG patients mean (S.D) anxiety score was 6.54 (4.54) using Hospital Anxiety and Depression Scale. Like anxiety, there can be variations observed in physiological parameters in a pre-operative period. In a single-blinded randomized controlled trial among 60 women undergoing elective surgeries showed mean (S.D) of systolic blood pressure 134.10 (12.36), diastolic blood pressure 83.73 (9.7), pulse rate 88.23 (8.4), Respiration 24.83 (8.1) [15].

Although traditionally we use medications to reduce pre-operative anxiety, alternative treatments have attracted increasing attention. [16] Music therapy is providing a different kind of music to the patients to help reduce the anxiety level and physiological parameters [17]. Music relaxes the patient and helps a maintenance release of endorphins from the brain which reduces the pain, relaxes the muscle and reduces blood pressure. It also gives a positive effect on heart rate, respiratory rate, anxiety level, and wound healing. Research studies indicate that music is an effective nursing intervention for anxiety [18].

Methods

A True experimental study comprising of pretest-posttest control group design was adopted. The objectives of the research were to assess the effectiveness of music on anxiety and physiological parameters among pre-operative patients undergoing coronary artery bypass grafting and to determine the association between the pre-interventional level of anxiety and physiological parameters with the selected baseline variables. The study setting was the tertiary cardiac care hospital in Bangalore. In this study, 60 sample (Experimental-30 and Control-30) were selected using simple random sampling techniques. The inclusion criteria for the study were all patients who were proposed to undergo elective CABG and patients who have moderate to severe anxiety as measured by the Beck Anxiety Inventory Scale (BAI). The investigator has adopted the Ludwig Von Bertalanffy's (1968) General system theory for the conceptual framework. The tools used for the study were baseline variables, BAI and physiological parameters (Pulse Rate, Blood Pressure, Respiratory Rate). The baseline variables were age, gender, marital status, education, monthly income, occupation, place of living, habits, dietary habits, previous history of hospitalization, previous history of surgery and anxiety medication. BAI interpreted the anxiety as low, moderate and severe. The data collection (Table-1) was done with the Ethical clearance from the Institutional Ethics Committee and written informed consent from the participants of the study was obtained.

Table 1: Intervention protocol and data collection

Group	Pretest	Treatment		Post test
Experimental	Prior Day To Surgery	Pre-operative teaching about CABG using Pamphlet	Music -20-30 min	1 Hour After Treatment
	Day of Surgery (2 hours before shifting to OT)		Music -20-30 min	1 hour before shifting the patient to O.T
Control	Prior Day To Surgery	Pre-operative teaching about CABG using Pamphlet		1 Hour before Treatment
	Day of Surgery (2 hours before shifting to OT)			1 hour before shifting the patient to O.T

Results: Data were analyzed by the use of Descriptive statistics (Mean, Frequency and Standard Deviation) and Inferential statistics (Repeated measure ANOVA, McNemars Chi –square test) using SPSS.

Findings related to the frequency and percentage distribution of baseline and clinical variables: The data presented in table -2 showed that the majority (36.67%) of them were between 50-59 years in both the groups. The majority of them were males and married. Regarding education, 36.67% had achieved high school certificate education for both groups. Almost half of the subjects had an occupation like a clerical, shop owner, a farmer in both groups. Around 40% of both groups income was equal or below Rs. 10,000. The majority were from rural area i.e.73.33% in experimental and 46.67% in control. And regarding bad habits 33.33% had a habit of smoking and alcohol. The majority of the subjects were non-vegetarian 90% and 83% in both the experimental and the control groups respectively. There were 63.33 in experimental and 56.67% in the control group had a previous history of hospitalization and the majority of them had not undergone any surgery in the past. Regarding anti-anxiety medication Inj. Diazepam was given to 33.33% in experimental and 43.33% in control group.

The frequency and percentage distribution of the physiological parameters of both the groups majority of them had a pulse rate of 81-100 beats/min, respiratory rate of 21 breath/min and blood pressure between 121/81-140/90mmHg.

Table 2: Frequency and percentage distribution of subjects undergoing CABG according to baseline variables. n_1=30, n_2=30

S. No	Baseline variables	Experimental	Control
		f (%)	f (%)
	Age in years		
1	a) <39	5 (17%)	4 (13%)
	b) 40 – 49	10 (33%)	8 (27%)
	c) 50 – 59	11 (37%)	11 (37%)
	d) >60	4 (13%)	7 (23%)
2	**Gender**		
	a) Male	21 (70%)	30 (100%)
	b) Female	9 (30%)	0
3	**Marital status**		

	a) Married	28 (93%)	25 (83%)
	b) Single	2 (7%)	3 (10%)
	c) Divorce	0	1 (3%)
	d) Widowed	0	1 (3%)
	Education		
	a) Postgraduate	3 (10%)	2 (7%)
	b)Graduate	9 (30%)	10 (33%)
4	c)Higher seconadary/PUC	3 (10%)	0
	d)High school certificate	11 (37%)	11 (37%)
	d)Middle school certificate	1 (3%)	1 (3%)
	e)Primary school certificate	1 (3%)	5 (17%)
	f)Illiterate	2 (7%)	1 (3%)
	Occupation		
	a) Profession	5 (17%)	4 (13%)
	b) Semi-profession	2 (7%)	1 (3%)
5	c) Clerical, shop-owner, farmer	15 (50%)	16 (53%)
	d) Skilled worker	3 (10%)	2 (7%)
	e) Semi-skilled worker	1 (3%)	1 (3%)
	f) Unskilled worker	4 (13%)	2 (7%)
	g) Retired / unemployed	0	4 (13%)
	Monthly income		
	a) Below 10,000	11 (37%)	12 (40%)
6	b) 10,001 – 20,000	3 (10%)	3 (10%)
	c) 20,001 – 30,000	7 (23%)	4 (13%)
	d) 30,001 – 40,000	5 (17%)	7 (23%)
	e) 40,001 and more	4 (13%)	4 (13%)
	Area of residence		
7	a) Rural	22 (73%)	14 (47%)
	b) Semi-rural	7 (23%)	11 (37%)
	c) Urban	1 (3%)	5 (17%)
	Habit		
	a) Smoking	6 (20%)	2 (7%)
8	b) Alcohol	0	1 (3%)
	c) Chewing tobacco / betel leave	6 (20%)	7 (23%)
	d) Smoking and alcohol	10 (33%)	10 (33%)
	e) No bad habit	8 (27%)	10 (33%)
	Dietary habit		
9	a) Vegetarian	3 (10%)	5 (17%)
	b) Non- vegetarian	27 (90%)	25 (83%)
	Previous history of hospitalization		
10	a) Yes	19 (63%)	17 (57%)
	b) No	11 (37%)	13 (43%)
	Previous history of surgery		
11	a) Yes	2 (7%)	2 (7%)
	b) No	28 (93%)	28 (93%)
	Anti-anxiety medication		
	a) Diazepam	10 (33%)	13 (43%)
12	b) Lorazepam	6 (20%)	8 (27%)
	c) Clonazepam	2 (7%)	3 (10%)

Findings related to assessment of the level of anxiety among the experimental and control group: The pre interventional anxiety in the experimental group showed that 97% reported severe anxiety and 3% had moderate anxiety. And in the control group, 77% had severe anxiety and the remaining had moderate anxiety.

Findings related to the effectiveness of music therapy in anxiety among CABG patients
Fig 1and 2 showed the level of anxiety at a different period. The findings showed a greater reduction of anxiety in the experimental group from severe to moderate anxiety.

The Table 3 showed the mean (SD) of pre and post-intervention scores were 38.1333 ± 4.67372 and 30.7667 ± 3.31853 respectively, with a mean difference of 7.3666 and t-value was 12.322 and it was found to be significant among the experimental group. Thus, the null hypothesis H_{01} is rejected at a 0.05 level of significance.
Table-4 depicted the effectiveness of music therapy by comparing post interventional anxiety score of experimental and control groups, both the days post interventional scores F value was found to be significant at 0.05 level. Thus, the null hypothesis H_{02} is rejected.
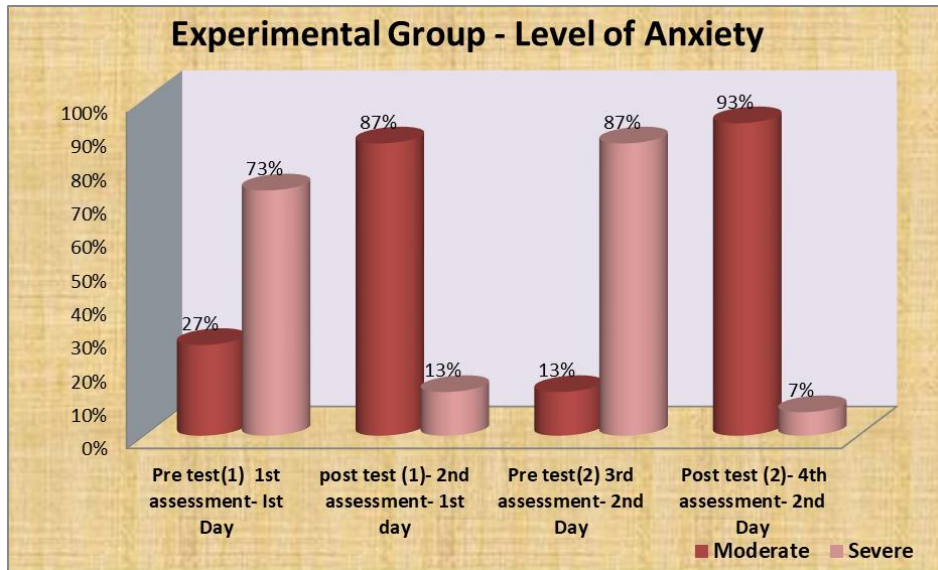
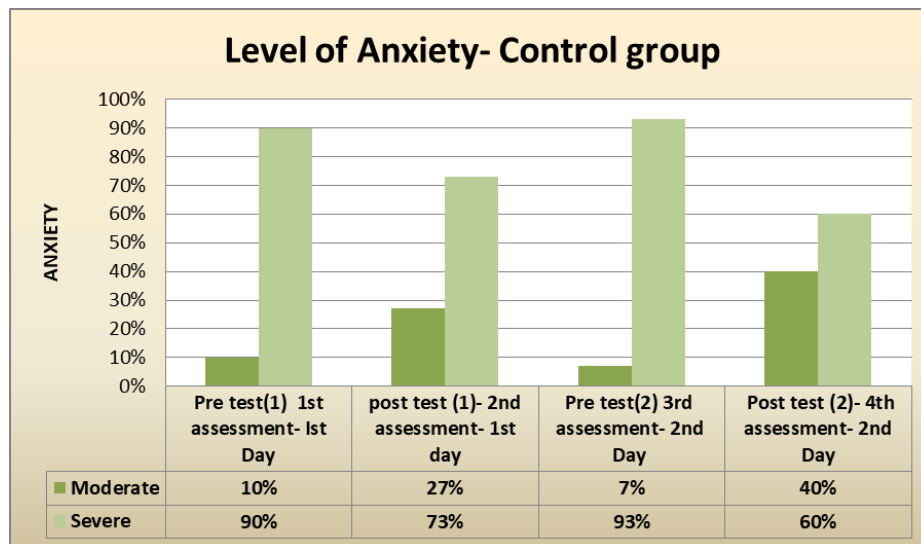**Fig 1:** Level of anxiety –Experimental group

Fig 2: Level of anxiety – Control group

Table 3: Effectiveness of music therapy on anxiety among CABG patients in the experimental group.

Experimental group	Mean (S.D)	Mean difference	t-value
Pre-interventional	38.1333 (4.67)	7.3666	12.322*
Post intervention	30.7667(3.31)		
* *P*< 0.05 level of significance			

Table 4: Comparision of the group in post-assessment across times and groups

Variables			Post assessments	F-value
			Mean ±SD	
Beck's anxiety inventory	Day1	Experimental	31.37±3.439	179.316*
		Control	36.70±3.544	
	Day2	Experimental	30.77±3.319	417.03*
		Control	36.13±4.032	
*** *P*< 0.05 level of significance				

Findings related to the Effectiveness of music therapy on physiological parameters among CABG patients

The mean value of pre-intervention in pulse, blood pressure, and respiration were 91.20, 124/84 and 21.1667 respectively, and the post-interventional pulse, blood pressure, and respiration were 85.3, 121/80 and 18.2 respectively. The t value for pulse, Blood pressure and Respiration were 5.741, 3.247 and 13.349 respectively. It was found to be significant at a 0.05 level of significance among the experimental group. Thus, the null hypothesis H_{01} is rejected. The effectiveness of music therapy by comparing post interventional physiological score of experimental and control groups was done by McNemar test. Post interventional scores value was found to be significant at 0.05 level for respiration. Thus, the null hypothesis H_{02} is rejected for respiration.

Findings related to the association between pre-interventional anxiety score and physiological parameters and selected baseline variables

There was a significant association between age and the pre-experimental anxiety score at 0.05 level of significance and for other variables and physiological parameters, there was no association found. Hence H_{03} was rejected to the baseline variable age.

Discussion

Coronary artery diseases have increased recently as the population ages and as changes in eating habits and lifestyle have led to higher incidences of diabetes, high blood pressure, and hyperlipidaemia. Most of these patients experience anxiety because of a heart examination, unfamiliar hospital environment, isolation from family, and stress from different treatments like surgical procedures.

In this study, the majority of them were males with the age group of 40-59 years, and also married. This data is supported by a similar study, in which there was 30% of females and 70% of males, and were belonged to the age group of 46-65, [19] 53-89 [20] years and 95% were married. [19, 21] Regarding the educational qualification, it was supported by a similar study where 56% had completed high school and 44% with higher education. [19, 20] The majority of the patients had a history of hospitalization in both the groups which is contrast to a Turkey study. [19] And the majority of the patients in both the group does not have a previous history of surgery 93%. In contrast to this data, an Iranian study showed that majority had undergone previous surgery [22].

The pre interventional mean and standard deviation of anxiety among the experimental and control group were 38.13± 4.674, 40 ± 3.37 respectively. But in post-intervention it was 30.76 ± 3.31, 36.13 ± 4.03. The present results are supported by a randomized controlled trial, in Iran [23].

The analysis of the effectiveness of music showed a significant reduction of anxiety in the experimental group was supported by a similar study done among cataract [24] and minor surgery [25] patients. Related to physiological parameters the results were consistent with a randomized controlled trial study were no significant differences regarding the cardiovascular indices in the three consecutive measurements (P > 0.05) [26] were noted.

There was an association between pre interventional anxiety score and selected baseline variables of age but for other variables, there was no association found. There were no supportive studies found.

Overall, the results of this study indicated that patients undergoing CABG experience a high percentage of anxiety and variations in physiological parameters. Music therapy can be used as a complementary therapy to reduce anxiety. Considering the advantages of this method as an easy, inexpensive, safe and noninvasive approach, the application of this non-pharmacological method is recommended to reduce patients' anxiety before conducting diagnostic and invasive procedures.

Acknowledgement

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