

# Effect of Music Therapy in Relieving Anxiety in Patients Undergoing Surgery

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## ABSTRACT

**Introduction:** Surgery and anaesthesia provoke anxiety in almost all the patients, causing increased sympathetic activity, leading to increase in heart rate and blood pressure. Non pharmacological means are now being evaluated for relieving anxiety and stress during perioperative period due to their safe and non interfering profile among the multitude pharmacological interventions and music is one of the most practical and easy to use application.

**Aim:** This study was conducted to evaluate the effects of a preoperative music intervention on changes in anxiety levels and its indirect haemodynamic parameters which are mean arterial pressures, heart rate and serum catecholamine levels in patients undergoing surgery.

**Materials and Methods:** A total of 100 patients were included of which 50 each were assigned to the music intervention group and the control group. Serum catecholamine levels were assessed in 10 patients from each group randomly. Patients in the intervention group

listened to music during the preoperative period for a minimum period of 20 minutes which was continued till the patient was rolled into the operation theatre. Patients in the control group received standard care without any intervention. Data was collected preoperatively at time 1 (T1) in the pre-surgical area and at time 2 (T2) before induction in the operation theatre and analysed with professional statistical software.

**Results:** There was statistically significant decrease in the HR, MAP and anxiety score (2-tailed significance <0.001), in the intervention group as compared to those in the control group. Also there was significant decrease in the serum epinephrine levels with significance (0.039) but norepinephrine levels were not declined significantly in the control group.

**Conclusion:** Music is a non-invasive and low-cost intervention that can be easily implemented in the preoperative setting and the findings suggest that preoperative music can reduce HR, MAP and anxiety.

**Keywords:** Catecholamine levels, Haemodynamic parameters, Sympathetic activation

## INTRODUCTION

Patients undergoing surgery almost always feel significant anxiety. Anxiety leads to activation of the sympathetic nervous system which is manifested in the form of changes in respiratory rate, heart rate and blood pressure [1-4]. Anxiety in the preoperative period may cause elevation in the level of endogenous catecholamines, cortisol and natural killer lymphocytes, which may lead to delayed wound healing and recovery [5]. Many studies have shown that anxiety before the surgical procedure increases requirements of anaesthetic dosages [5]. Various anti-anxiety drugs are being used to alleviate surgical anxiety. But their dose has to be kept low to avoid untoward side effects in the form of respiratory depression, excessive sleepiness, lethargy, etc.

These days more focus is being given to non-pharmacological interventions for reduction of preoperative anxiety, such as

music therapy now being referred to as “music medicine” interventions. “Music medicine” involves passive listening to pre-recorded music which is offered by medical personnel.

Music therapy has been used in cognitive treatments and has been found very effective in modifying the psychological status [6,7]. Musical sounds have been used as a therapeutic approach in various psychological disorders. Many branches in the field of medicine mainly neurology and psychology have found music as efficacious as low dose anti-anxiety medications [8,9]. Various studies have been performed using music as part of the treatment modality mainly done in cardiology, neurology, geriatrics, oncology, autism, depression, immunology and anxiety [6]. We planned this study to assess the impact of music in relieving patients’ anxiety preoperatively.

## MATERIALS AND METHODS

This case-control study was conducted in Indira Gandhi Medical College using computerised randomisation software among patients posted for surgery from March 2016 onwards till completion of data end point (i.e., 100 patients). A total of 100 patients undergoing various surgical procedures like cholecystectomy, ureterolithotomy, gynaecological procedures, hernia, etc., were included in the study of the age group between 20 to 50 years. Patients of ASA physical status I & II were enrolled in the study. Patients with mental disorders (e.g., bipolar disorder, schizophrenia, or cognitive impairment), ear diseases and patients who did not give consent for listening to music were excluded from the study.

Patients were randomly allocated in to two groups MT (Music Therapy) and NMT (Non Music Therapy). Group (MT) patients were assigned to the music intervention pre-operatively and group (NMT) patients were kept as control. Patients were given 0.25 mg alprazolam on the night before surgery. Patients were not given any pharmacologic anxiolytic therapy on the day of surgery. After signing the consent form, the researchers introduced themselves to the patients and explained the study objectives. Then necessary explanations were provided concerning the examination related to anxiety. Anxiety was measured by using visual analogue scale for anxiety. Respondents were asked "How much anxiety are you experiencing right now?" [Table/Fig-1]. Responses indicated intensity of feeling on a 1 to 4 scale.

Patient's Response	Grading of Scale
Not at all	1
Somewhat	2
Moderately so	3
Very much so	4

[Table/Fig-1]: Anxiety grading response.

Patients in the MT group listened to pre-recorded, familiar, soft music by using headphones during the pre-operative period for a minimum period of 20 minutes. Music preferred in this study was patient selected. Mainly three types of music was selected i.e. spiritual music (Bhajans, Kabir Amritwani), folk music and bollywood hindi songs. Patients were taken to operating room while listening to the music. NMT group patients received standard care without music intervention. Data (MAP, HR, anxiety grade) was recorded at time 1 (T1) in the presurgical area (baseline values) before providing music therapy and at time 2 (T2) before induction in the operation theatre with music on. Blood sample of randomly assigned 10 patients in both groups was taken just after T2 measurements to assess serum catecholamine levels. Sample for catecholamine levels was taken during insertion of intravenous cannula and the tests were funded by laboratory

so that patients did not have any extra burden due to study.

Demographic data collected to assess any variations in the group included age, gender, and medications such as beta blockers were taken before surgery.

## RESULTS

All patients enrolled in the study completed the study successfully. There was no statistically significant difference in both the groups with regard to demographic data. The baseline values of heart rate, MAP and anxiety grade were comparable in both the groups at time T1. Our study showed a highly significant reduced anxiety levels in patients who received music therapy than control group (p-value of <0.001). MAP and heart rate were lower in the MT group compared to NMT group after music intervention. Both the study and control group had statistically similar number of patients taking beta blocker therapy, hence removing the confounding factor. Serum epinephrine levels were significantly lower in the music group, relating with the anxiety scales whereas, no significant difference was found in the serum nor-epinephrine levels [Table/Fig-2-4].

Observation	Group MT	Group NMT	p-value
Number of Patients	50	50	
Age	32.74±8.218	31.28±7.362	>0.05
Sex (M/F)	26/24	27/23	>0.05

[Table/Fig-2]: Demographic profile.

Observation	Time	MT	NMT	p-value
Anxiety Grade	(T1)	2.88±.627	2.74±.487	0.216
	(T2)	1.76±.59	2.92±0.52	<0.001**
Heart Rate	(T1)	85.28±8.432	84.20±8.064	0.514
	(T2)	79.42±7.262	90.48±7.608	<0.001**
MAP	(T1)	84.70±8.428	83.00±6.468	0.261
	(T2)	80.20±7.557	89.22±8.476	<0.001**

[Table/Fig-3]: Heart rate, MAP and Anxiety grade of Patients at time 1 and 2.

\*\* denotes highly significant difference between variables

Serum Catecholamine Levels (pg/mL)		MT 10 Patients	NMT 10 Patients	p-value
Epinephrine	(T2)	30.30±2.359	32.90±2.846	0.039
Nor-Epinephrine	(T2)	185.90±17.08	187.50±15.204	>0.05

[Table/Fig-4]: Serum catecholamine levels in 10 patients each of MT and NMT group.

## DISCUSSION

Music is an entity giving positive reinforcement and soothing feeling equivalent to reward which is due to activation of nucleus accumbens, anterior cingulate gyrus, etc., in

mesocorticolimbic system [10].

The positive effect of music is widely known and is scientifically proven to be due to stimulation of brain structures known to regulate autonomic, emotional and cognitive function [11]. Many studies have shown that music can decrease the anxiety associated adrenergic response of the body leading to decrease in the surge of catecholamines. Music therapy is being more frequently researched for therapeutic effects. It is being used in many fields of medicine like psychiatry, neurology, etc.

Music therapy in perioperative period is being studied for its theoretical and experienced positive effects. Our study found significant difference in anxiety levels; clearly lower levels in patients listening to their preferred music. Haemodynamic parameters related to anxiety also showed similarly significant differences in the groups, higher being in non music group. Similar findings have been found in other studies too in relation to music intervention in peri-operative areas, radiation therapy and in general nursing care [12-16]. In a study by Pamela et al., on the effects of music in relieving peri-operative anxiety in patients undergoing mastectomy. They found significantly higher HR ( $p < 0.001$ ), MAP ( $p < 0.001$ ) and anxiety scores (0.00) in the non intervention group [15].

Our study also found a significantly lower serum epinephrine levels in the music intervention group supporting the role of music in decreasing adrenergic related to anxiety. However, norepinephrine levels were statistically similar in both the groups. Our finding differs from the study conducted by Lin et al., who found less significant difference in norepinephrine and epinephrine values ( $p = 0.619$ ) after music intervention. But this study correlates with our study in terms of reduction in anxiety ( $p = 0.018-0.001$ ) and mean blood pressure ( $p = 0.014$ ) in the group of patients who listened to music [11].

Sarkar et al., conducted a study to see the effect of music in patients undergoing caesarean section under spinal anaesthesia [12]. They found to have significantly low value in the respiratory rate ( $p = 0.004$ ), pulse rate ( $p = 0.017$ ), anxiety score ( $p = 0.00$ ) than control patients. There was no significant difference in systolic ( $p = 0.405$ ) and diastolic blood pressure ( $p = 0.513$ ) on completion of the surgery [12]. It has been seen that age, culture, socio-economic status, and religion affect the way people respond to music [13]. Music selected in our study was patient preferred familiar one which led to positive impact in the study as unknown music may not provide relief to the patient anxiety. Study done by Clark et al., correlates with our study in imposing the effect of preferred music in relieving anxiety [14].

## LIMITATIONS

Our study had limited subjects, more randomised controlled double blind studies in large patients' data is needed to further substantiate or refute the results of this study.

Role of music in decreasing the sympathetic response by affecting serum catecholamine levels is further need to be studied with larger patient population.

## CONCLUSION

Music is a very effective, low cost, non pharmacological tool to relieve anxiety in patients in the preoperative period. It also stabilises haemodynamics parameters. As this intervention is absolutely safe to the patients and can be easily applied in the operative settings with almost no cost, institution of music during preoperative period should be seriously considered, if not constituted by all.

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