

EFFECT OF PREOPERATIVE MUSIC THERAPY ON ANAESTHETIC DRUG REQUIREMENT AND PERIOPERATIVE ANXIETY: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

P. J. Deepashri Marieta^{1*}, Prabhu Kolandhasamy², Rajkumaran Kamaraj³

^{1,3} Department of Anaesthesia, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Thandalam, Chennai- 602105

²Department of Anaesthesia, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Thandalam, Chennai- 602105

*Corresponding Author: P. J. Deepashri Marieta- deepashrimarieta@gmail.com

ABSTRACT

Perioperative anxiety is the psychological response of patients before and during surgery under general anaesthesia, and can lead to increased sympathetic activity, haemodynamic instability, greater need for anaesthetic drugs, in addition to delayed recovery and subsequent decreased postoperative outcomes. In this study, we assess the effectiveness of music therapy as a non-invasive approach to reduce perioperative state anxiety and improve perioperative comfort. Nevertheless, its effects on the requirement of anaesthetic drugs and haemodynamic stability in patients undergoing elective surgeries with general anaesthesia are poorly defined. This study is a prospective randomised single-blinded controlled study of 60 adult patients with ASA physical status I & II undergoing elective surgeries under general anaesthesia. A total of thirty patients were randomised into either Group M (Music Therapy group) or Group C (Control group). Patients of Group M were made to listen to soft instrumental music using headphones for about 20–30 mins before the induction of anaesthesia, and patients in Group C received routine preoperative care. The primary outcome of the present study was preoperative anxiety as measured using the Amsterdam Preoperative Anxiety and Information Scale (APAIS) and Visual Analogue Scale for Anxiety (VAS-A). Primary outcomes were perioperative anxiety scores and anaesthetic drug requirement. The secondary outcomes included overall intraoperative crude consumption of fentanyl, as well as haemodynamic parameters, the state anxiety score at 1 h after surgery and patient satisfaction. Preoperative music therapy significantly reduces perioperative anxiety in patients scheduled for an elective surgery under general anaesthesia. Post-intervention APAIS and VAS-A scores were significantly lower in the Music Therapy group compared to the Control group ($p < 0.001$). Participants receiving music therapy also required significantly lower propofol induction dose (124.6 ± 15.8 mg vs 146.9 ± 18.3 mg; $p < 0.001$) and lower intraoperative fentanyl consumption (78.4 ± 12.6 μ g vs 96.7 ± 15.1 μ g; $p < 0.001$). Improved haemodynamic stability and significantly higher postoperative patient satisfaction scores were additionally observed in the Music Therapy group. Preoperative music therapy decreased perioperative anxiety, anaesthetic drug consumption, and resulted in better haemodynamic stability and increased postoperative patient satisfaction. These results endorse the use of music therapy as a safe, cheap and effective supplemental component in perioperative anaesthesia.

KEYWORDS: Music Therapy; Perioperative Anxiety; General Anaesthesia; APAIS; VAS-A; Propofol Requirement; Haemodynamic Stability; Patient Satisfaction.

INTRODUCTION

Perioperative anxiety is a frequent psychological response to the experience of undergoing surgery under general anaesthesia and may have considerable impact on relevant perioperative outcomes. Surgical-related fear, as well as fear of anaesthesia, postoperative pain and uncertainty about the recovery period following surgery, can lead to sympathetic nerve system activation and consequently cause tachycardia, hypertension and fluctuations in haemodynamics during induction of anaesthesia, leading to increased anaesthetic requirement as well as a prolonged postoperative recovery.¹ In addition, increased perioperative anxiety has been linked to more usage of analgesics, lower patient satisfaction, and a delay in hospital leave.² These concerns have brought greater focus to effective anxiety management during the perioperative period as part of balanced anaesthesia and enhanced recovery protocols.³

Pharmacological anxiolytic agents are frequently prescribed in the preoperative period to lower anxiety and enhance perioperative comfort. But these agents also can result in side effects such as excessive sedation, respiratory depression, prolonged recovery times, postoperative drowsiness and difficulty with early assessment.⁴

Due to these limitations, non-pharmacological approaches have gained interest as they may eliminate the potential for drug-related adverse effects and complement other interventions that can help safely alleviate perioperative anxiety.

Among the different non-pharmacological methods, music therapy has become one of the simplest, most economical, safest and easily implementable strategy in peri-operative care. It is thought that music soothes and calms a person with its stress response modulating ability and autonomic nervous system facilitation.⁵ Multiple studies have shown that perioperative music interventions can reduce anxiety, stress response and perioperative sedative requirement.⁶ More recent systematic reviews have also found improvement in perioperative comfort and decreased anxiety among surgical patients receiving music therapy.⁷

Perioperative music therapy is not new and has consistently demonstrated beneficial effects on anxiety and stress responses, but there are heterogeneous differences between studies in patient population, type of surgery, timing of intervention and outcome assessment. More recent studies also indicate that music therapy might decrease perioperative sedative and anaesthetic need.⁸ On the contrary, there is no evidence regarding its impact on anaesthetic drug use and intraoperative anxiety in adult elective patients undergoing General Anaesthesia in Indian population.

Although the evidence regarding the role of perioperative music therapy is emerging, very few Anaesthesia studies have specifically studied its effect on anaesthetic drug consumption, intra-operative analgesic requirements and perioperative anxiety in adult Indian patients undergoing elective surgeries under general anaesthesia. In addition, more data is required regarding its effects on perioperative haemodynamic stability and postoperative patient satisfaction.

‘The current study has been designed to evaluate the effect of perioperative music therapy on the requirement of narcotic drugs and perioperative anxiety in the adult population undergoing elective surgeries under general anaesthesia. This study not only evaluates perioperative anxiety as measured with validated anxiety scoring systems but also assesses induction dose of propofol and intraoperative analgesic consumption, group comparisons of haemodynamic stability, postoperative anxiety levels and patient satisfaction making it a comprehensive study that emphasises the applicability of music therapy into clinical practice as a safe and effective adjunct to perioperative care.’

MATERIAL AND METHODOLOGY

This study was conducted as a prospective randomised single-blinded controlled trial in the operation theatres of Saveetha Medical College and Hospitals, Chennai after obtaining approval from Institutional Ethics Committee. We conducted this study for 4 months to evaluate the effect of preoperative music therapy on anaesthetic drug requirement and perioperative anxiety in adult patients aged 18–60 years belonging to American Society of Anesthesiologists (ASA) physical status I and II who underwent elective surgeries under general anaesthesia. All methods were performed in accordance with the relevant guidelines and regulations of the institution. The informed consent from all participants was obtained prior to enrolment in the study. During the interim analysis, no patient-related data remained accessible.

Study population was comprised of adult patients aged 18 to 60 years with American Society Of Anesthesiologists (ASA) physical status I and II who were posted for elective surgeries under G/A. Children or non-competent adults, hearing impaired patients, psychiatric illness, cognitive impairment, current use of anxiolytic or antidepressant medication (other than a benzo in the setting of acute agitation), emergency surgeries and unwillingness to participate were exclusion criteria.

The study was comprised of 60 participants, referencing the recent RCT by Wang et al., in which music intervention was performed before anaesthesia induction with a between-group difference identified for post-intervention anxiety score.⁹ The minimum estimated sample size based on the difference in anxiety scores assessed in that study was 27 patients per group. Each group was estimated to include 30 participants, assuming dropouts and non-completion of data collection, leading to a total sample size of 60 patients. A sample size of 36 was sufficient to detect clinically significant changes in perioperative anxiety and anaesthetic drug requirement between the two groups.

Participants were randomized to two study groups using computer-generated randomization. There was adequate allocation concealment throughout the study period to minimize selection bias. This was a single-blind procedure that is participants were blinded to group allocation. This approach ameliorated observer bias and strengthened the internal validity of this study's results.

Participants in the study were assigned to:

- **Group M (Music Therapy Group):** Patients received calming instrumental music through headphones for 20–30 minutes during the preoperative period before induction of anaesthesia.
- **Group C (Control Group):** Patients received routine preoperative care without music intervention.

All patients underwent comprehensive pre-operative assessment (history taking, clinical examination and routine pre-anaesthetic check-up) followed by meticulous preparation for surgery. Pre intervention anxiety scoring with Amsterdam preoperative anxiety and information scale (APAIS) and visual analogue scale for anxiety (VAS-A),

was done along with vital parameters. Prior to induction of anaesthesia, all patients have been following standard fasting protocols.

Anxiety scores and vital parameters were reassessed after the intervention before induction of anaesthesia. All subjects underwent ASA standard monitoring intraoperatively; including electrocardiography (ECG), non-invasive blood pressure (NIBP), pulse oximetry (SpO₂) and end-tidal carbon dioxide (EtCO₂) as well as temperature monitoring. To ensure consistency in anaesthetic management and decrease procedural variability within groups, all the patients were managed with a standardised general anaesthesia protocol.

Operational definitions were developed to provide consistent and reproducible assessment of the outcome. APAIS and VAS-A scores were used to evaluate the perioperative anxiety. Background APAIS is a validated six-item, 2–3 min questionnaire that aims to assess perioperative anxiety and information need among surgical patients. Items were scored 1–5, and the total anxiety score was between 4 and 20 with higher scores indicating more anxiety. VAS-A: Patients were evaluated from 0 to 10, where 0 was no anxiety and 10 maximum anxiety.

‘Anaesthetic drug requirement was analysed using induction dose of propofol and intraoperative analgesic consumption. Intraoperative analgesic request was defined as the total dose of all systemically administered analgesic agents in addition to IV acetaminophen, measured within 24 hours after surgery. Heart rate, systolic BP, diastolic BP and mean arterial pressure were recorded at specific periods in the perioperative period. Intraoperative changes of these parameters and requirement for inotropes were evaluated, compared between groups.’

Patients in both groups underwent assessment and comparison of the postoperative anxiety scores, recovery characteristics, and patient satisfaction. Adverse effects, including discomfort in relation to headphone use or music, excessive sedation, nausea, vomiting, dizziness/irritation were monitored and recorded during the perioperative period. The main outcomes of the investigation were perioperative anxiety scores and anaesthetic drug requirement within or outside groups. Secondary outcomes comprised intraoperative haemodynamic stability, postoperative anxiety scores, total intraoperative analgesic use and satisfaction.

A prestructured proforma designed specifically for the study was used for data collection. Trained personnel consistently recorded data on perioperative observations and postoperative assessments to promote reproducibility of data collection. To anonymize and protect patient-related information, a unique study identification number was assigned to each participant. Statistical data analysis was performed using Statistical Package for Social Sciences SPSS software version 26.0. Descriptive statistics were used to report normal variables as mean $\pm$ standard deviation; categorical variables were presented in frequency and percentage. In comparison, continuous variables were compared with independent t-test and categorical variables with chi-square test between both groups. We assessed serial intraoperative haemodynamic parameters measured at several time points using repeated measures ANOVA. Statistical significance was determined with $p < 0.05$

RESULTS

The demographic and clinical characteristics were comparable between Music Therapy and Control groups, which was an indication of sufficient randomization and homogenous baseline study population. The mean age of those that participated was comparable in both groups (38.9 ± 9.1 years vs 39.7 ± 8.5 years), with the most participants falling into the 31–40 years age bracket (33% vs 36.7%). The distribution of body mass index was also similar by group, with most individuals classified as overweight (43.3% vs 46.7%).

The distribution for gender and ASA physical status was almost similar within each group suggesting an adequate allocation of participants between the study groups. The majority of participants were ASA physical status I 60.0% vs ASA II 63.3%. The mean duration of surgery and showed no difference between Music Therapy and Control groups (98.6 ± 17.4 minutes vs 101.2 ± 19.1 minutes). At baseline, haemodynamic parameters including heart rate and mean arterial pressure did not differ significantly between arms.

Baseline assessment revealed a similar pre-operative anxiety score between the two groups. In the Music Therapy arm and Control arm respectively, mean baseline APAIS score was 13.6 ± 2.4 and 13.9 ± 2.6 Baseline VAS-A mean score was 6.8 ± 1.2 and 7.0 ± 1.4 in group A and B respectively ($p = ns$). The demographic and clinical characteristics at baseline were similar between groups prior to administration of the intervention, thus providing confidence that the two groups are fairly comparable in respects necessary for a comparison of subsequent outcomes (Table 1).

Table 1. Distribution of Baseline Demographic and Clinical Characteristics Among Participants in the Music Therapy and Control Groups

Variable	Category	Group M – Music Therapy (n = 30)	Group C – Control (n = 30)
Age (years)	Mean $\pm$ SD	38.9 ± 9.1	39.7 ± 8.5
	18–30 years	7 (23.3%)	6 (20.0%)
	31–40 years	10 (33.3%)	11 (36.7%)
	41–50 years	8 (26.7%)	9 (30.0%)
	51–60 years	5 (16.7%)	4 (13.3%)

BMI (kg/m ²)	<25 (Normal)	12 (40.0%)	11 (36.7%)
	25–29.9 (Overweight)	13 (43.3%)	14 (46.7%)
	≥30 (Obese)	5 (16.7%)	5 (16.7%)
Gender	Male	17 (56.7%)	16 (53.3%)
	Female	13 (43.3%)	14 (46.7%)
ASA Physical Status	ASA I	18 (60.0%)	19 (63.3%)
	ASA II	12 (40.0%)	11 (36.7%)
Duration of Surgery (minutes)	Mean ± SD	98.6 ± 17.4	101.2 ± 19.1
Baseline Heart Rate (beats/min)	Mean ± SD	82.7 ± 7.3	83.5 ± 6.9
Baseline Mean Arterial Pressure (mmHg)	Mean ± SD	90.8 ± 5.8	91.4 ± 6.2
Baseline APAIS Score	Mean ± SD	13.6 ± 2.4	13.9 ± 2.6
Baseline VAS-A Score	Mean ± SD	6.8 ± 1.2	7.0 ± 1.4

ASA: American Society of Anesthesiologists; BMI: Body Mass Index; APAIS: Amsterdam Preoperative Anxiety and Information Scale; VAS-A: Visual Analogue Scale for Anxiety; SD: Standard Deviation.

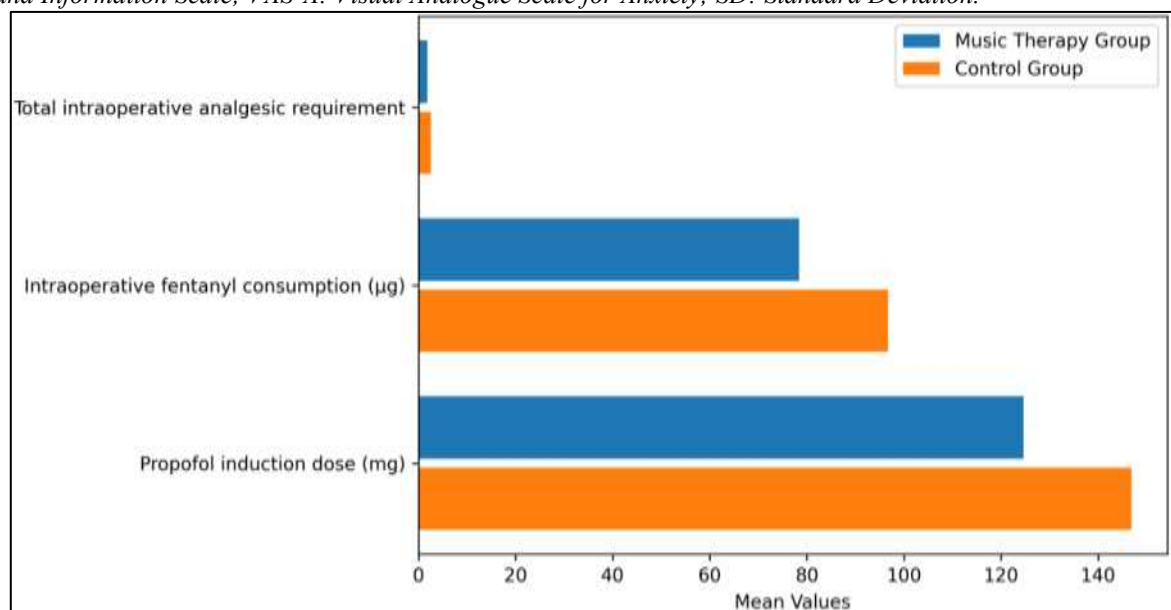


Figure 1-Comparison of perioperative APAIS scores between the Music Therapy and Control groups at baseline, post-intervention, and postoperative assessment.

The difference in mean perioperative anxiety scores post-intervention was significantly different between the study groups. Baseline APAIS and VAS-A scores did not differ significantly between the Music Therapy vs Control groups ($p > 0.05$). Means comparisons indicated that the APAIS score at intervention was significantly different in the Music Therapy group vs Control (8.4 ± 1.9 vs 12.8 ± 2.3 ; $p < 0.001$). APAIS scores were also significantly lower 2 days after surgery in the therapy group (post-op 6.9 ± 1.7 vs control subjects 10.7 ± 2.1 ; $p < 0.001$). Similar results were found when assessed using the Visual Analogue Scale for Anxiety. The Music Therapy group had significantly lower VAS-A scores than the Control group after therapy (3.5 ± 1.1 vs 6.1 ± 1.5 ; $p < 0.001$). The results showed that postoperative VAS-A scores were also significantly lower in patients receiving music therapy (2.8 ± 0.9 vs 5.0 ± 1.3 ; $p < 0.001$). These results reveal that preoperative music therapy has a positive effect on lowering perioperative anxiety in general anaesthesia for noncardiac elective surgery patients (Table 2).

Table 2. Comparison of Perioperative Anxiety Scores Between the Music Therapy and Control Groups

Anxiety Assessment Parameters	Group M – Music Therapy (n = 30) Mean ± SD	Group C – Control (n = 30) Mean ± SD	p-value
APAIS Score			
Baseline	13.6 ± 2.4	13.9 ± 2.6	0.648
Post-intervention	8.4 ± 1.9	12.8 ± 2.3	<0.001
Postoperative	6.9 ± 1.7	10.7 ± 2.1	<0.001

VAS-A Score			
Baseline	6.8 ± 1.2	7.0 ± 1.4	0.572
Post-intervention	3.5 ± 1.1	6.1 ± 1.5	<0.001
Postoperative	2.8 ± 0.9	5.0 ± 1.3	<0.001

AP AIS: Amsterdam Preoperative Anxiety and Information Scale; VAS-A: Visual Analogue Scale for Anxiety; SD: Standard Deviation.

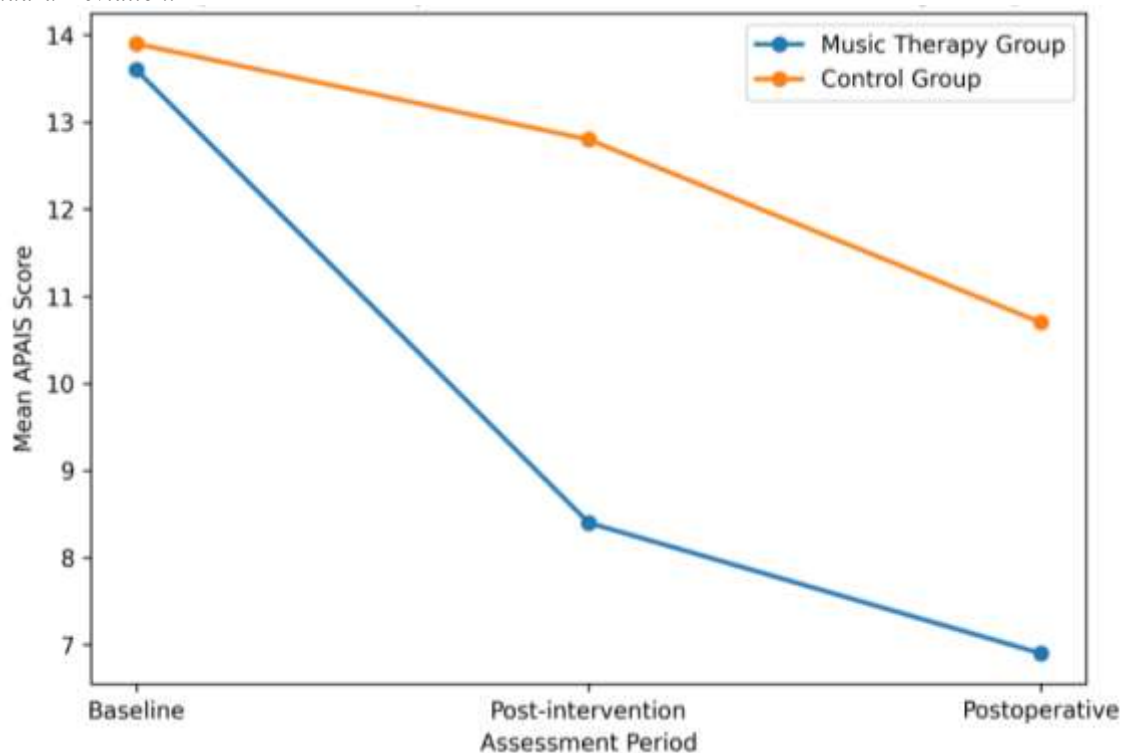


Figure 2-Comparison of anaesthetic drug requirement between the Music Therapy and Control groups showing propofol induction dose, intraoperative fentanyl consumption, and total intraoperative analgesic requirement.

Anaesthetic drug requirement (preoperative music therapy significantly decreased the amount of anaesthetic and analgesic medications used compared with controls). Importantly, the average induction dose of propofol was lower in the Music Therapy group than Control (124.6±15.8 mg vs 146.9±18.3 mg, $p < 0.001$). The total intraoperative fentanyl consumption was also significantly lower in the Music Therapy group compared with Control (Music Therapy: 78.4 ± 12.6 µg vs Control: 96.7 ± 15.1 µg; $p < 0.001$). However, the total intraoperative analgesic requirement was significantly smaller in Music Therapy group (1.8 ± 0.6 vs. 2.6 ± 0.8; $p = 0.002$). Results presented here suggest that administration of preoperative music therapy reduced overall anaesthetic drug consumption during the surgery (Table 3). Perioperative haemodynamic assessment showed that only participants receiving music therapy were more stable in terms of haemodynamics. The mean intraoperative heart rate was significantly lower in the Music Therapy group (78.6 ± 6.8 beats/min) than in the Control group (84.9 ± 7.4 beats/min; $p < 0.001$).

Table 3. Comparison of Anaesthetic Drug Requirement Between the Music Therapy and Control Groups

Anaesthetic Parameters	Group M – Music Therapy (n = 30) Mean ± SD	Group C – Control (n = 30) Mean ± SD	p-value
Propofol induction dose (mg)	124.6 ± 15.8	146.9 ± 18.3	<0.001
Intraoperative fentanyl consumption (µg)	78.4 ± 12.6	96.7 ± 15.1	<0.001
Total intraoperative analgesic requirement	1.8 ± 0.6	2.6 ± 0.8	0.002

SD: Standard Deviation.

In a similar manner to the other variables, Music Therapy was also associated with significantly lower mean systolic blood pressure (118.4 ± 8.2 mmHg vs 126.7 ± 9.1 mmHg; $p = 0.002$). Mean diastolic blood pressure and

mean arterial pressure measurements were also significantly lower in the music therapy group. In comparison, the Music Therapy group had a mean diastolic blood pressure of 74.6 ± 5.7 mmHg vs. Control 80.3 ± 6.4 mmHg ($p = 0.001$), while mean arterial pressure was also lower; Music Therapy 89.2 ± 6.1 mmHg and Control group 95.6 ± 6.8 mmHg respectively ($p = 0.001$). These findings indicate that preoperative music generally exerts a positive impact on perioperative haemodynamic variables (Table 4). For postoperative patients, self-evaluations showed significantly greater satisfaction in the group receiving music therapy. Patient satisfaction score in the Music Therapy group was significantly greater than in Controls (8.6 ± 1.1 vs 6.9 ± 1.4 ; $p < 0.001$).

Table 4: Comparison of Perioperative Haemodynamic Parameters Between the Study Groups

Parameters	Group M – Music Therapy (n = 30) Mean $\pm$ SD	Group C – Control (n = 30) Mean $\pm$ SD	p-value
Mean Heart Rate (beats/min)	78.6 ± 6.8	84.9 ± 7.4	<0.001
Mean Systolic Blood Pressure (mmHg)	118.4 ± 8.2	126.7 ± 9.1	0.002
Mean Diastolic Blood Pressure (mmHg)	74.6 ± 5.7	80.3 ± 6.4	0.001
Mean Arterial Pressure (mmHg)	89.2 ± 6.1	95.6 ± 6.8	0.001

Lower incidence of adverse effects in the Music Therapy arm, but between-group non-significant. Control, n = 15 and Music Therapy Group n = 30) of nausea and vomiting were analysed. The rate of over-sedation was 3.3% and 13.3%, respectively ($p = 0.161$). Headphone discomfort was mild in 6.7% of subjects who received music therapy; only 1 (3.3%) subject reported irritation or dislike of the music. Preoperative music therapy was well tolerated, improved patient satisfaction and had few adverse effects (Table 5). Preoperative music therapy is an effective and well-tolerated intervention for the treatment of patients undergoing elective surgery under general anaesthesia with its related clinically relevant perioperative anxiety reduction, reduced anaesthetic drug requirement, better haemodynamic stability (compared to baseline), and more postoperative patient satisfaction. The simple, safe and well-tolerated intervention has the potential to be an effective non-pharmacological adjunct in perioperative care.

Table 5: Comparison of Postoperative Patient Satisfaction and Adverse Effects Between the Study Groups

Variables	Group M – Music Therapy (n = 30)	Group C – Control (n = 30)	p-value
Patient satisfaction score Mean $\pm$ SD	8.6 ± 1.1	6.9 ± 1.4	<0.001
Nausea/Vomiting n (%)	2 (6.7%)	6 (20.0%)	0.128
Excessive sedation n (%)	1 (3.3%)	4 (13.3%)	0.161
Discomfort related to headphones n (%)	2 (6.7%)	0 (0.0%)	0.150
Irritation/dislike of music n (%)	1 (3.3%)	0 (0.0%)	0.313

SD: Standard Deviation.

DISCUSSION

This present study showed that preoperative music therapy significantly reduced perioperative anxiety, anaesthetic agent requirement and hemodynamic alterations in patients undergoing elective surgeries under general anaesthesia. Post-recovery APAIS scores were significantly less in the Music Therapy group (8.4 ± 1.9 vs 12.8 ± 2.3 ; $p < 0.001$), a trend that continued postoperatively (6.9 ± 1.7 vs 10.7 ± 2.1 ; $p < 0.001$). VAS-A scores after intervention were also significantly lower in the Music Therapy group than Control patients (3.5 ± 1.1 vs 6.1 ± 1.5 ; $p < 0.001$). Music therapy also halved the doses of induction propofol (124.6 ± 15.8 mg vs 146.9 ± 18.3 mg; $p < 0.001$) needed by those receiving it and required less intraoperative fentanyl (78.4 ± 12.6 μ g vs 96.7 ± 15.1 μ g; $p < 0.001$). Subjects had more synchronous haemodynamic stability if they were given music therapy, receiving scores that indicated consistently high patient satisfaction. In conclusion, results of this review indicate that preoperative music therapy may serve as a beneficial adjunct in perioperative care.

The current findings of alleviating perioperative anxiety were similar to some previous studies, e.g. Wang et al. demonstrated that in patients undergoing elective surgery, the haemodynamic fluctuations and perioperative stress response during induction of general anaesthesia were significantly attenuated with a music intervention¹⁰. The

present study noted similar findings, and the patients receiving music therapy had significantly lower scores for anxiety and better haemodynamic parameters than patients in the Control group.

In a systematic review on technology-based music interventions, Park et al. found that overall use of music therapy had positive effects by decreasing anxiety, pain perception and the need for sedative medication among patients undergoing surgery and invasive procedures.¹¹ These prior studies are supported by the results of the current study in which both APAIS and VAS-A scores were significantly decreased after music intervention with less anaesthetic drug requirement. In the present study, music therapy provided during surgery was associated with significant reductions in both induction doses of propofol and intraoperative total consumption of fentanyl as compared to the Control group. The findings coincide with those reported by Fu et al, who observed that perioperative music interventions significantly decreased the need for perioperative analgesics and opioid consumption in surgical patients.¹² Stress response to surgery and emotional relaxation from music therapy may also reduce anaesthetic and analgesic need in the perioperative period.

The present study also showed significant improvement in principles of perioperative haemodynamic stability of the participants receiving music therapy. The Music Therapy group had significantly lower mean intraoperative heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure ($P < 0.001$). Similar findings were shown in the study of Jiang et al. who reported that patients whose perioperative music intervention had significantly increased cardiovascular stability, decreased anxiety and improved perioperative comfort.¹³

The present study, however, supports the literature of improved postoperative patient satisfaction. Giordano et al. compared music therapy with intravenous midazolam and found that the use of music improved perioperative comfort and reduced anxiety without pharmacological side effects.¹⁴ In another study, Gokçek and Kaydu showed that perioperative music therapy enhances the recovery quality of patients undergoing surgery under general anaesthesia with respect to patient satisfaction.¹⁵

Lin et al. It also showed that music therapy significantly heightened patient satisfaction and decreased perioperative anxiety in surgical patients undergoing general anaesthesia. 16 In the current study, postoperative satisfaction scores were significantly better among those who received music therapy compared to those who did not; moreover, adverse effects related to music intervention were minimal and clinically insignificant. The proportion of participants experiencing discomfort due to headphone use or disliking music was limited.

The various merits of the current study include a prospective randomised controlled design, comparable baseline characteristics between the study cohorts and validated anxiety assessment tools used (APAIS & VAS-A). The study further evaluated various clinically relevant perioperative end points using anxiety scores, anaesthetic drug requirement, haemodynamic parameters and patient satisfaction to allow a comprehensive assessment of the effects of music therapy during the perioperative period.

However, some limitations need to be acknowledged. This is a single-institution study done at a tertiary care centre with a small sample size. Another factor that can act as a moderator of the effect seen between the music outcomes may be differing individual preferences and responses to music in general, particularly regarding anxiety. In addition, no long-term postoperative psychological recovery and delayed postoperative outcomes were evaluated in this study. Future multicentric, larger-sample studies with an evaluated patient-selected music intervention may help provide high quality of evidence for a potential pathway to incorporate music therapy in routine perioperative care protocols.

CONCLUSION

The present study indicates that preoperative music therapy is effective in substantially reducing perioperative anxiety and anaesthetic drug requirement in patients undergoing elective surgery under general anaesthesia. Patients in the MTP group were more hemodynamically stable; they had lower anxiety scores and less requirement of propofol (mean 980 mg v/s 1450 mg) and fentanyl (mean 779 µg v/s 1690 µg), which are associated with better postoperative patient satisfaction when compared to the control group. The intervention was inexpensive, easy to carry out and safe, as well as being accepted by the majority of patients. The purpose of this trial is to provide proof-of-concept for the use of music therapy as a simple, nonpharmacological adjunct in routine anaesthetic practice with implications on patient comfort and perioperative outcomes.

Acknowledgments

The authors are grateful to Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai – 602 105, Tamil Nadu, India.

REFERENCES

1. Yang KL, Lu CY, Tsai PS, Wang TY. Effects of perioperative anxiety on postoperative recovery and clinical outcomes in surgical patients: a systematic review. *J Clin Anesth.* 2023; 84:110987.
2. Nigussie S, Belachew T, Wolancho W. Predictors of preoperative anxiety among surgical patients in low-resource settings. *BMC Surg.* 2020;20(1):67.

3. Ljungqvist O, de Boer HD, Balfour A, et al. Opportunities and challenges for the next phase of enhanced recovery after surgery: a review. *JAMA Surg.* 2021;156(8):775-784.
4. Carr ZJ, Cios TJ, Potter KF, Swick JT. Does premedication with oral benzodiazepines improve perioperative outcomes? A systematic review. *Anesth Analg.* 2020;130(5):1144-1154.
5. Kühlmann AYR, de Rooij A, Kroese LF, et al. Meta-analysis evaluating music interventions for anxiety and pain in surgery patients. *Br J Surg.* 2018;105(7):773-783.
6. Shukla U, Sharma K, Singh A. Effect of music therapy on anxiety, stress and sedative requirement during surgery under regional anaesthesia. *Cureus.* 2024;16(11):e74211.
7. Li G, Zhang Y, Wang X, et al. Effects of perioperative music therapy on patients with surgical procedures: a systematic review. *Front Med (Lausanne).* 2024;11:1287442.
8. McClurkin SL, Smith CD. The duration of self-selected music needed to reduce preoperative anxiety. *J Perianesth Nurs.* 2016;31(3):196-203.
9. Wang J, Jiang L, Chen W, Wang Z, Miao C, Zhong J, et al. Effect of music on hemodynamic fluctuations in women during induction of general anesthesia: a prospective randomized controlled multicenter trial. *Braz J Anesthesiol.* 2024;74(2):101-108.
10. Park S, Lee S, Howard S, Yi J. Technology-based music interventions to reduce anxiety and pain among patients undergoing surgery or procedures: systematic review of the literature. *JMIR Mhealth Uhealth.* 2024;12:e48802.
11. Fu VX, Oomens P, Klimek M, Verhofstad MHJ, Jeekel J. The effect of perioperative music on medication requirement and hospital length of stay: a meta-analysis. *Ann Surg.* 2020;272(6):961-972.
12. Jiang F, Zhou X, Liu Y, et al. Personal versus therapist perioperative music intervention: a randomized controlled trial. *Int J Surg.* 2024;110:4661-4670.
13. Giordano F, Zanchi B, De Leonardi F, et al. Effect of preoperative music therapy versus intravenous midazolam on anxiety, sedation and stress in stomatology surgery: a randomized controlled study. *J Clin Med.* 2023;12(9):3215.
14. Gökçek E, Kaydu A. The effects of music therapy in patients undergoing septorhinoplasty surgery under general anesthesia. *Braz J Otorhinolaryngol.* 2020;86(4):419-426.
15. Lin PC, Lin ML, Huang LC, Hsu HC, Lin CC. Music therapy for patients receiving surgery under general anaesthesia: effects on anxiety and patient satisfaction. *J Clin Nurs.* 2020;29(15-16):2840-2848.