



HARMONIZING HEALING: EXPLORING THE THERAPEUTIC INFLUENCE OF MUSIC ON PREOPERATIVE AND INTRAOPERATIVE ANXIETY AND VITAL SIGNS IN SPINAL ANAESTHESIA

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Abstract

Introduction: Preoperative anxiety is common and can elevate stress responses, increasing anesthetic needs and delaying recovery. While anxiolytics are used, they have side effects. Music therapy, a nonpharmacological approach, may help reduce anxiety by influencing brain pathways related to emotion. This study evaluates its effectiveness in surgical patients.

Material and Methods: This randomized controlled trial evaluates the impact of music therapy on preoperative and intraoperative anxiety in patients undergoing elective surgeries under spinal anaesthesia. Conducted at GMERS Medical College, Junagadh, 46 patients were assigned to music therapy (MT) and non-music therapy (NMT) groups. Anxiety levels and vital signs were measured at baseline, after 30 minutes, and after 60 minutes. The study aims to assess music's effectiveness as a nonpharmacological anxiolytic.

Results: At baseline, there were no significant differences between the Music Therapy (MT) and Non-Music Therapy (NMT) groups in terms of demographic characteristics or most vital parameters. However, at 30 and 60 minutes, the MT group showed significantly lower systolic and diastolic blood pressure, as well as heart rate, compared to the NMT group. Additionally, the MT group demonstrated significantly reduced anxiety levels at both T30 and T60, highlighting the effectiveness of music therapy in reducing anxiety and improving physiological outcomes in preoperative and intraoperative patients.

Conclusion: This study demonstrates that music therapy effectively reduces preoperative and intraoperative anxiety, improves vital signs, and creates a more relaxed surgical environment. Its low cost, non-invasive nature, and no side effects make it a promising alternative to medication. Further research is needed to optimize its use across clinical settings.

Keywords: Music Therapy, Anxiety, Spinal Anaesthesia, Non-Pharmacological Intervention, Surgical Environment

Introduction

Surgical procedures often provoke significant anxiety in patients, a common emotional response that can affect both psychological and physiological well-being. Anxiety activates the sympathetic nervous system, causing notable changes such as increased heart rate, elevated blood pressure, and altered respiratory patterns. Additionally, this stress response triggers the release of hormones like cortisol and catecholamines, which can impair immune function, delay wound healing, and slow overall recovery after surgery¹.

The presence of heightened anxiety before surgery has been linked to increased requirements for anesthetic agents during the procedure, complicating anesthesia management. Research indicates that higher preoperative anxiety often leads to a greater need for anesthetic medication during the procedure².

While medications to reduce anxiety are commonly administered before surgery, their doses must be carefully limited to prevent adverse effects such as slowed breathing, excessive drowsiness, and reduced alertness. Given these concerns, attention has shifted towards nonpharmacological approaches for anxiety reduction, with music therapy emerging as a notable intervention. Often referred to as “music medicine,” this method involves the passive listening to music of patient’s choice (sufi/bhajan/instrumental), which has been employed successfully in various medical fields to address patients’ physical, emotional, and spiritual needs³.

Research supports the psychological benefits of music, demonstrating its ability to modulate mood and reduce stress by stimulating the limbic system—the brain’s center for emotions. This stimulation promotes the release of endorphins, natural neurochemicals that enhance mood and provide analgesic effects, thereby potentially improving patients’ overall experience⁴.

The current study aims to assess the effectiveness of music therapy in alleviating preoperative and intraoperative anxiety. By evaluating both subjective anxiety levels and physiological markers, this research seeks to provide robust evidence supporting music therapy as a safe, cost-effective, and patient-friendly strategy that can be integrated into routine preoperative care to optimize clinical outcomes and enhance patient satisfaction.

Anxiety as a trait can be measured by various scales. These include the Spielberger’s State-Trait Anxiety Inventory (STAI), Hamilton score, the General Anxiety-Visual Analog Scale (GA-VAS), the Verbal Rating Scale, the Numerical Rating Scale, and the Yale Preoperative Anxiety Scoring⁵, among these, the visual analogue scale of anxiety is particularly notable for its ease of use, straightforward administration, and validated reliability in measuring anxiety.

Aims and Objectives

This study focuses on exploring how music therapy can help reduce anxiety in patients undergoing spinal anesthesia during surgery, paying special attention to its effects on vital signs such as blood pressure, heart rate, and oxygen saturation. Anxiety before and during surgery is a widespread issue that can negatively influence surgical results and delay recovery. By considering music therapy as a safe, non-drug option, this research aims to provide a holistic approach that enhances patient comfort and supports the maintenance of stable physiological functions throughout the surgical process.

Material and Methods

A randomized controlled study was conducted at GMERS Medical College, Junagadh, involving 46 adult participants who met the inclusion criteria and provided written informed consent. The study period spanned from November 2024 to August 2025, following approval from the institutional ethical committee. Eligible participants were adults aged between 18 and 40 years, classified as ASA physical status I or II, and scheduled for elective surgeries under spinal anesthesia. Patients were excluded if they declined participation or had any history of hepatic, renal, cardiac, or respiratory diseases, psychiatric disorders, previous anesthesia exposure, hearing impairments, or communication difficulties. Participants were randomly assigned to either the Music Therapy (MT) or Non-Music

Therapy (NMT) group using sealed opaque envelopes to ensure allocation concealment, following standard randomization procedures⁶, All patients were administered oral alprazolam the night before surgery. On the day of surgery, patients arrived approximately 30 minutes prior to their scheduled procedure and were settled in the preoperative area. Baseline measurements including heart rate, blood pressure (systolic, diastolic), oxygen saturation, and anxiety levels assessed by the Visual Analogue Scale of Anxiety (VASA) were recorded upon arrival (T0). No additional anxiolytics were given. Following baseline assessment, patients in the MT group listened to their preferred genre of music(sufi,bhajan,instrumental) for 30 minutes using a smartphone, followed by repeat measurements of vital signs and anxiety scores (T30). Music therapy continued for the MT group after transfer to the operating theatre, and a final set of measurements including heart rate, blood pressure, oxygen saturation, and anxiety was recorded 60 minutes after the start of the intervention (T60), consistent with established methods for music interventions in clinical settings.⁷

Table 1: Visual Analogue Score of Anxiety

1	FAINT	My anxiety is barely noticeable with no physical symptoms.
2	MILD	My anxiety is light and I am not focusing on it. Physical symptoms are light.
3	MODERATE	My anxiety is bothering me but can be ignored. I may feel light physical symptoms like a slightly faster heartbeat.
4	TROUBLING	My anxiety is constant but not too limiting. Physical symptoms increase and may include nausea, etc.
5	DISTRACTING	My anxiety is interfering with my life. My productivity may be affected. I may feel physically ill.
6	DISTRESSING	My anxiety controls my attention. I am unable to be productive and am focused on fixing the anxiety.
7	INTENSE	My anxiety is deteriorating my lifestyle. I am ignoring other obligations and plans to focus on the anxiety.
8	UNMANAGEABLE	My anxiety is so bad I can barely interact with my surroundings. I may be unable to focus on anything but the anxiety trigger.
9	SEVERE	My anxiety is unbearable. I am having a panic attack or dissociating severely and may have difficulty connecting to reality.
10	DEBILITATING	My anxiety may require emergency attention. I may be having intense flashbacks and cannot connect with the present reality.

Results

Table 2: Demographic characteristics of the patients

PARAMETERS	MT GROUP	NMT GROUP	P
AGE	26.70±5.55	26.1±4.3	0.69
GENDER	23 female (100%)	23 female (100%)	Not applicable
ASA (GRADE 1/GRADE 2)	1/22	0/23	0.313
DURATION OF SURGERY	1.36±0.45	1.22±0.25	0.18

Table 2 presents the demographic characteristics of patients in both the Music Therapy (MT) and Non-Music Therapy (NMT) groups. Age, gender, and ASA physical status and duration of surgery were comparable across the groups. Since all participants were female, gender distribution was identical, and statistical testing for gender differences was not applicable. The ASA classification was predominantly grade II for most patients in both groups, with only a small variation in the MT group (in MT group 22 patients with ASA grade 2 and 1 patient with ASA grade 1, and in NMT group all patients were with ASA grade 2). Additionally, the duration of surgical procedures and age showed no meaningful difference between groups. Overall, no statistically significant differences were found in any of these baseline characteristics, indicating that both groups were well matched for comparison.

Table 3: Observed parameters AT T0

VITALS	MT GROUP	NMT GROUP	P
SBP	134.87±7.18	136.52±8.61	0.0484
DBP	82.35±9.75	83.48±5.65	0.634
HR	103.78±18.69	95.74±10.52	0.081
SPO2	98.65± 0.91	98.87±0.42	0.326

Table 3 shows comparison of vital parameters (SBP, DBP, HR, SpO₂) between two groups of patients (MT group vs. NMT group) at baseline (T0), along with the corresponding p-values for statistical significance testing. at baseline (T0), most vitals were comparable between the two groups, showed statistically insignificant except for systolic blood pressure (SBP), which showed a statistically significant difference.

Table 4: Observed parameters AT T30

VITALS	MT GROUP	NMT GROUP	P
SBP	126.30±9.75	134.78±6.76	0.0005
DBP	74.09±8.93	82.70±5.38	0.0003
HR	92.30±15.18	94.17±8.93	0.614
SPO2	98.65±0.85	98.83±0.39	0.262

Table 4 compares vital signs between the MT and NMT groups 30 minutes after the intervention. The results show that the MT group had lower systolic and diastolic blood pressure compared to the NMT group, indicating a significant effect of the MT intervention in reducing blood pressure. This suggests that the intervention may help in better blood pressure control. On the other hand, heart rate and oxygen saturation levels were similar in both groups, with no significant differences. This means the intervention had little to no impact on heart rate and oxygen levels at this time point.

Table 5: Observed parameters AT T60

VITALS	MT GROUP	NMT GROUP	P
SBP	117.83±7.28	131.17±6.65	0.000000065
DBP	69.39±7.35	81.83±5.51	0.000000063
HR	82.87±13.14	94.04±10.01	0.013
SPO2	98.74±0.85	98.78±0.0	0.77

Table 5 compares vital signs between the MT and NMT groups at sixty minutes post-intervention. Both systolic and diastolic blood pressures were significantly higher in the NMT group, indicating a stronger blood pressure-lowering effect in the MT group. Heart rate was also significantly elevated in the NMT group, showing a notable difference between the groups. However, oxygen saturation levels remained similar across both groups, suggesting that the intervention did not impact this parameter. Overall, the findings highlight that the MT intervention effectively reduced blood pressure and heart rate compared to the NMT group, while oxygen levels stayed stable.

Table 6: VASA Score Comparison

VASA SCORE	MT GROUP	NMT GROUP	P VALUE
T0	3.04±0.63	2.91±0.68	0.505
T30	2.43±0.50	2.78±0.63	0.043
T60	1.78±0.49	2.65±0.56	0.0000013

Table 6 compares anxiety levels, measured by VASA scores, between the MT and NMT groups at baseline, 30 minutes, and 60 minutes. At baseline, both groups had similar anxiety levels, showing no significant difference. However, at 30 minutes, the MT group experienced a noticeable reduction in anxiety compared to the NMT group. This difference became even more pronounced at 60 minutes, with the MT group exhibiting significantly lower anxiety levels. These results suggest that the MT intervention effectively reduces anxiety over time compared to the NMT group.

Discussion

The primary aim of this study was to assess the impact of music therapy (MT) on preoperative and intraoperative anxiety, as well as on key physiological parameters such as heart rate (HR), blood pressure, and oxygen saturation (SpO₂) in patients undergoing surgery under spinal anaesthesia. Our findings provide valuable insights into the potential of music therapy as a nonpharmacological intervention for anxiety reduction in the perioperative setting.

Effectiveness of Music Therapy in Reducing Anxiety

The results from this study underscore the significant anxiety-reducing effects of music therapy in preoperative and intraoperative patients. At baseline (T0), there were no significant differences in anxiety scores between the MT and NMT groups, suggesting that both groups experienced similar levels of anxiety upon arrival at the hospital. However, by the end of the preoperative music intervention (T30), the MT group showed a significant reduction in anxiety levels compared to the NMT group. This trend continued through the intraoperative period (T60), where the MT group exhibited significantly lower anxiety scores, as evidenced by the highly significant difference in VASA scores ($p = 0.0000013$).

These findings are consistent with the broader literature, which supports the role of music therapy in reducing anxiety in various healthcare settings, particularly in patients undergoing surgery. Music has been shown to exert therapeutic effects through its ability to engage the limbic system, which is responsible for regulating emotions and stress responses (Thoma et al., 2013).⁸ By listening to music, patients may experience enhanced relaxation, reduced perception of anxiety, and improved emotional well-being. The present study adds to this body of evidence, demonstrating that even brief interventions with music, tailored to the patient's preferences, can have a notable impact on anxiety levels in the perioperative setting.

Physiological Responses to Music Therapy

In addition to its effects on anxiety, we also examined the impact of music therapy on physiological marker such as blood pressure, heart rate, and oxygen saturation, which are closely linked to the body's stress response. At baseline (T0), there were no significant differences in these parameters

between the MT and NMT groups, suggesting that the preoperative physiological stress response was similar across both groups. However, significant differences emerged during the intervention period. At T30 and T60, the MT group showed notably lower systolic and diastolic blood pressures compared to the NMT group, with these differences reaching statistical significance ($p < 0.001$). The MT group's heart rate was also significantly lower at T60 ($p = 0.013$), indicating that music therapy may have a calming effect on the autonomic nervous system, thus reducing the physiological markers of anxiety. This is in line with previous studies that have reported the beneficial effects of music therapy in modulating the autonomic nervous system, including heart rate and blood pressure (Bradt & Dileo, 2014).³

Implications for Clinical Practice

The results of this study have important implications for clinical practice, particularly in the perioperative care of surgical patients. Anxiety is a common preoperative challenge, and its management plays a critical role in optimizing surgical outcomes. Pharmacological interventions, such as anxiolytics, are frequently used to manage preoperative anxiety. However, these drugs are associated with potential side effects, including sedation, respiratory depression, and delayed recovery times. Music therapy, on the other hand, offers a non-invasive, cost-effective, and patient-friendly alternative that can complement or even replace pharmacological treatments in some cases.

Our findings suggest that incorporating music therapy into standard preoperative protocols can be a valuable strategy to reduce anxiety and improve the overall surgical experience for patients. By fostering a relaxed and calm environment, music therapy may also facilitate better management of anesthesia, reduce the need for additional analgesics, and potentially enhance recovery times. Furthermore, because music therapy has no significant side effects, it is a safe option for a wide range of patients, including those who may be contraindicated for pharmacological treatments.

Yadav N et al⁵ conducted this randomized controlled trial including 104 adult patients undergoing laparoscopic cholecystectomy, divided into two groups: Group I received alprazolam 0.25 mg, and Group II received alprazolam 0.25 mg along with music therapy. The study aimed to evaluate the effect of music therapy on anxiety and vital signs preoperatively. Baseline and post-intervention measurements were taken for heart rate, blood pressure, and respiratory rate at three time points (T0, T30, and T60). Results showed that the addition of music therapy significantly lowered anxiety and improved physiological parameters compared to alprazolam alone, suggesting a beneficial adjunct for preoperative management.

Jain A et al⁹ performed a prospective study to evaluate the effects of music therapy on stress response and anesthetic requirements in patients undergoing lower limb surgery under spinal anesthesia. Sixty patients classified as ASA I and II were randomly assigned to either a music group, who listened to Raag Neelambari, or a control group with no music. The results revealed that the music group experienced significantly lower postoperative pain, reduced nausea and vomiting, and greater patient satisfaction. The study concluded that music therapy is a simple, non-invasive, and effective approach to reduce perioperative complications, enhance patient comfort, and decrease analgesic use.

Bansal P et al¹⁰ investigated the impact of music therapy on preoperative anxiety, intraoperative sedation, and sedative requirements in patients undergoing spinal anesthesia. One hundred patients were randomized to a music therapy (MT) group, which listened to soothing, patient-selected music, or a control group with no music. Their findings demonstrated that patients in the MT group required significantly lower doses of midazolam for sedation. Additionally, music therapy positively influenced hemodynamic parameters such as heart rate, reducing stress and promoting relaxation.

Shu-Ming Wang et al (2014)¹¹ assessed the effects of music therapy on anxiety and vital signs in patients undergoing cesarean section under spinal anesthesia. Published in the Journal of Clinical Nursing, the study assigned patients to either a music therapy or control group. Results showed that the music therapy group had significant reductions in anxiety, heart rate, and blood pressure compared to controls, supporting music therapy as a valuable, non-invasive intervention to improve patient outcomes during spinal anesthesia.

Limitations and Future Directions

While this study provides strong evidence for the benefits of music therapy in reducing preoperative and intraoperative anxiety, several limitations should be acknowledged. First, the study focused on a relatively homogeneous patient population (young, healthy females undergoing elective surgery), which may limit the generalizability of the results to other patient groups, such as older adults, males, or those with chronic medical conditions. Future research could aim to explore the effects of music therapy in more diverse patient populations, as well as in different types of surgeries and anesthesia. Second, the choice of music genre (e.g., Sufi, bhajan, instrumental) was based on the patients' preferences, which may have varied. Future studies could further investigate whether certain types of music are more effective than others in reducing anxiety, or whether personalized playlists are more beneficial than generic ones. It would also be valuable to examine the duration of music therapy, as longer interventions may yield more pronounced effects.

Finally, while our study measured anxiety using the Visual Analog Scale (VAS) and monitored key physiological parameters, future research could consider incorporating more comprehensive assessments, such as cortisol levels or heart rate variability, to further explore the underlying mechanisms of music therapy's effects.

Conclusion

This study demonstrates that music therapy effectively reduces preoperative and intraoperative anxiety in patients undergoing surgery under spinal anaesthesia. The results show that music therapy significantly lowers anxiety scores and improves physiological parameters, including blood pressure and heart rate, compared to patients who did not receive music therapy.

Given its no side effects, low cost, and ease of implementation, music therapy offers a promising non-pharmacological alternative to anxiolytics, contributing to a more relaxed surgical experience and potentially enhancing recovery. These findings support the integration of music therapy into standard preoperative care, helping to optimize patient outcomes and improve the overall quality of care in surgical settings.

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