

A STUDY ON THE EFFECT OF MUSIC THERAPY ON PAIN AND ANXIETY IN ACTIVE STAGE OF LABOR

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ABSTRACT

Background: Labour pain during the active stage is multidimensional and closely intertwined with anxiety. Non-pharmacological adjuncts such as music therapy have been proposed to reduce both pain and anxiety without the accessibility limitations or side effects of pharmacological analgesia. The objective is to evaluate the effect of music therapy on pain and anxiety among women in the active stage of labour. **Materials and Methods:** Prospective interventional comparative study of 200 primigravida and multigravida women in active labour (cervical dilatation ≥ 4 cm) at PESIMSR, Kuppam, allocated by purposive sampling to a music therapy group (n=100, individualized music via headphones for a minimum of 30 minutes in addition to routine care) or a control group (n=100, routine intrapartum care alone). Pain was assessed using the Visual Analog Scale (VAS) and anxiety using the GAD-7 scale before and after the intervention period. **Result:** Baseline VAS and GAD-7 scores were comparable between groups (p=0.73 and p=0.84 respectively). Post-intervention, the music therapy group had significantly lower VAS pain scores (4.2 ± 1.4 vs 5.8 ± 1.6 ; p=0.001) and GAD-7 anxiety scores (5.2 ± 2.4 vs 7.6 ± 2.9 ; p=0.0005) than controls. Within-group reduction was significant in the music therapy group (pain: -1.7 points, p<0.001; anxiety: -3.2 points, p<0.001) but not in controls (pain: -0.2, p=0.12; anxiety: -0.9, p=0.18). The beneficial effect was consistent across parity and educational subgroups, and maternal and perinatal outcomes were uniformly good in both groups. **Conclusion:** Music therapy is an effective, safe, non-pharmacological adjunct that significantly reduces pain and anxiety during the active stage of labour, with a more pronounced effect on anxiety, without compromising maternal or perinatal outcomes.

INTRODUCTION

Labour pain is a distinctive and complex form of pain that evolves with the physiological progress of childbirth, reflecting not only the intensity of uterine contractions and cervical dilatation but also the individual woman's emotional state, expectations, cultural background, and coping ability. During the active stage of labour, uterine contractions and cervical dilatation generate visceral pain transmitted primarily through the T10 to L1 spinal segments, which is further shaped by emotional responses, environmental stimuli, and psychosocial factors.^[1,2] such that women with similar labour patterns may report markedly different pain intensities.

Anxiety during labour is closely intertwined with pain perception: heightened fear and apprehension can lower pain thresholds, amplify nociceptive input, and impair coping mechanisms, while intense pain can in turn escalate anxiety, creating a reinforcing

cycle.^[3] This interaction has been associated with prolonged labour, increased need for medical intervention, and diminished maternal satisfaction with childbirth,^[4] making effective management of both pain and anxiety an essential component of quality intrapartum care.

Pharmacological methods such as epidural, spinal, and systemic opioid analgesia are widely used and effective, but may not always be accessible or acceptable, particularly in busy tertiary care centres and low-resource settings, and primarily target nociceptive pathways rather than the emotional dimensions of labour pain.^[5] Non-pharmacological methods instead aim to modify pain perception through enhanced maternal coping, relaxation, and reduced anxiety, and are generally considered safe for both mother and fetus without interfering with the physiological course of labour.^[6]

Among non-pharmacological approaches, music therapy has gained attention as a non-invasive

intervention capable of influencing both emotional state and pain perception, acting through distraction, emotional regulation, and activation of descending inhibitory pathways.^[7] Music therapy is easy to administer, cost-effective, and culturally adaptable, and does not interfere with uterine contractions, maternal mobility, or fetal wellbeing. Emerging evidence suggests that women who listen to music during labour report lower pain scores, reduced anxiety, and improved coping with contractions compared with routine care alone,^[8] supporting its potential role as an adjunctive method during the active stage of labour.

In many healthcare settings, particularly in developing countries, access to pharmacological analgesia may be limited by resource constraints, lack of trained personnel, or infrastructural limitations, and women may seek alternative methods that align with personal preference and cultural belief.^[9] Although prior studies suggest beneficial effects of music therapy during labour, variations in methodology, study design, and population characteristics limit the generalizability of these findings, and evidence from Indian tertiary care hospitals remains particularly limited.^[10] This study was therefore designed to evaluate the effect of music therapy on pain and anxiety among women in the active stage of labour.

Aims and Objectives

Aim: To evaluate the effect of music therapy on pain and anxiety among women in the active stage of labour.

1. To assess the effect of music therapy on perceived pain levels among women during the active stage of labour.
2. To assess the effect of music therapy on anxiety levels among women during the active stage of labour.

MATERIALS AND METHODS

Study design and setting: Prospective interventional comparative study conducted in the Department of Obstetrics and Gynaecology, PES Institute of Medical Sciences and Research (PESIMSR), Kuppam, Andhra Pradesh, over 18 months (June 2024 to January 2026).

Study population and sample size: Antenatal women in the active stage of labour (cervical dilatation $\geq 4\text{cm}$) admitted to the labour ward were

eligible. Sample size was calculated using an expected prevalence of 70% and absolute precision of 9% at 95% confidence, yielding a minimum of 99 participants, rounded to 100 per group (200 total) using purposive sampling. Inclusion criteria were primigravida and multigravida women in active labour willing to participate; exclusion criteria were known psychiatric disorders, significant cardiovascular, renal, or hepatic disease or malignancy, intrauterine fetal demise, or unwillingness to participate.

Intervention: After informed written consent, participants in the experimental group received individualized music of their choice via headphones for a minimum of 30 minutes, in addition to routine intrapartum care; participants in the control group received routine standard labour care alone, without music therapy.

Outcome assessment: Pain was assessed using the Visual Analog Scale (VAS) and anxiety using the Generalized Anxiety Disorder-7 (GAD-7) scale, both before initiation and after completion of the 30-minute intervention period. Primary outcomes were change in VAS pain score and GAD-7 anxiety score; secondary outcomes were mode of delivery and duration of labour.

Statistical analysis: Data were entered in Microsoft Excel and analysed using SPSS version 23.0. Categorical variables were expressed as frequencies and percentages and continuous variables as mean $\pm$ standard deviation. Paired t-test was used to analyse within-group changes, and independent t-test/chi-square test for between-group comparisons, with $p < 0.05$ considered statistically significant.

RESULTS

A total of 200 women were enrolled, 100 in the music therapy group and 100 in the control group. Baseline socio-demographic characteristics (age, educational status, type of family, socioeconomic status, residence, obstetric score) and physiological parameters (pulse rate, systolic and diastolic blood pressure) were comparable between groups, with no statistically significant differences (all $p > 0.05$). Baseline VAS pain scores (5.9 ± 1.6 vs 6.0 ± 1.7 ; $p = 0.73$) and GAD-7 anxiety scores (8.4 ± 3.0 vs 8.5 ± 3.1 ; $p = 0.84$) were also similar between groups, confirming baseline equivalence.

Table 1: Baseline characteristics by study group

Parameter	Music Therapy (n=100)	Control (n=100)	p value
Mean age $\pm$ SD (years)	25.8 ± 3.9	26.1 ± 4.1	0.52
Baseline VAS pain score (mean $\pm$ SD)	5.9 ± 1.6	6.0 ± 1.7	0.73
Baseline GAD-7 anxiety score (mean $\pm$ SD)	8.4 ± 3.0	8.5 ± 3.1	0.84

Following the intervention, the music therapy group showed a significantly greater reduction in both pain and anxiety scores than the control group.

Table 2: Post-intervention VAS pain score, between-group and within-group comparison

Group	Pre-intervention (mean $\pm$ SD)	Post-intervention (mean $\pm$ SD)	Mean reduction	Within-group p	Between-group p
Music Therapy	5.9 ± 1.6	4.2 ± 1.4	1.7	< 0.001	0.001

Control	6.0 ± 1.7	5.8 ± 1.6	0.2	0.12	0.001
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Table 3: Post-intervention GAD-7 anxiety score, between-group and within-group comparison

Group	Pre-intervention (mean ± SD)	Post-intervention (mean ± SD)	Mean reduction	Within-group p	Between-group p
Music Therapy	8.4 ± 3.0	5.2 ± 2.4	3.2	<0.001	0.0005
Control	8.5 ± 3.1	7.6 ± 2.9	0.9	0.18	0.0005

Categorical distributions supported the mean-score findings: only 5% of the music therapy group remained in the severe pain category post-intervention, compared to 28% of the control group. On the GAD-7 scale, 42% of the music therapy group fell into the minimal anxiety category and 53% into the mild category post-intervention, with no cases of

severe anxiety, whereas the control group continued to show moderate (23%) and severe (3%) anxiety. Subgroup analysis by parity and educational status showed no statistically significant association with post-intervention pain or anxiety category in either group, indicating that the benefit of music therapy was consistent across these strata.

Table 4: Maternal and perinatal outcomes by study group

Outcome	Group	Good outcome, n (%)
Maternal outcome	Music Therapy (n=100)	100 (100%)
Maternal outcome	Control (n=100)	100 (100%)
Perinatal outcome	Music Therapy (n=100)	100 (100%)
Perinatal outcome	Control (n=100)	100 (100%)

Maternal and perinatal outcomes were uniformly good in both groups, with no adverse maternal or neonatal events recorded in either arm, indicating that music therapy did not adversely affect labour progress or fetal wellbeing.

DISCUSSION

The present study evaluated the effect of music therapy on pain and anxiety among women in the active stage of labour by comparing outcomes between a music therapy group and a control group, each comprising 100 participants. A key strength of the study was the baseline comparability between the two groups across socio-demographic variables, obstetric characteristics, physiological parameters, and baseline pain and anxiety scores, which strengthens the internal validity of the observed outcomes. Following intervention, the music therapy group demonstrated a clear and statistically significant improvement in both pain and anxiety, while maternal and perinatal outcomes remained uniformly good in both groups, indicating that music therapy did not adversely influence labour progress or neonatal wellbeing.

With respect to pain, the post-intervention mean VAS score in the music therapy group reduced to 4.2 ± 1.4 , whereas the control group continued to report a higher mean score of 5.8 ± 1.6 ($p=0.001$), and within-group analysis showed a mean reduction of 1.7 points in the music therapy group ($p<0.001$) compared with only 0.2 points in the control group ($p=0.12$). The categorical pain distribution supported this finding, with only 5% of the music therapy group remaining in the severe pain category post-intervention compared with 28% of the control group. These findings suggest that music therapy was effective in attenuating the escalation of pain typically associated with the active stage of labour rather than completely abolishing it, consistent with the goal of non-pharmacological interventions to improve pain

tolerance and coping rather than eliminate nociceptive input entirely.^[5,6]

A similar pattern was observed for anxiety. The post-intervention mean GAD-7 score in the music therapy group reduced to 5.2 ± 2.4 , compared with 7.6 ± 2.9 in the control group ($p=0.0005$), with a within-group reduction of 3.2 points ($p<0.001$) against a non-significant 0.9-point reduction in controls ($p=0.18$). This is consistent with the well-described relationship between anxiety and labour pain, wherein heightened anxiety amplifies pain perception and reduces coping capacity.^[3,4] The anxiety-reducing effect observed in this study is comparable with previous interventional studies: Tabatabaei et al. reported a significant reduction in anxiety scores with concurrent pain reduction in women exposed to music therapy during the active phase of labour,^[11] Ganji et al. demonstrated a sustained decline in anxiety levels over repeated assessments following music exposure,^[12] and Indian data from Xavier and Viswanath similarly showed significant post-intervention anxiety reduction without any effect on uterine contraction patterns.^[10] The present study also demonstrated a concurrent reduction in both pain and anxiety, with the magnitude of anxiety reduction (3.2 points) exceeding that of pain reduction (1.7 points), suggesting that the primary effect of music therapy may be mediated through emotional modulation, which subsequently influences pain perception — consistent with the neurophysiological understanding that anxiety amplifies labour pain by enhancing sympathetic activity and central pain sensitivity.^[3,4] Similar dual improvement has been reported by Tabatabaei et al,^[11] and Ganji et al,^[12] while Simavli et al., in both their 2014 and 2019 randomized controlled trials, reported that women exposed to music therapy experienced lower intrapartum pain and anxiety alongside improved childbirth satisfaction,^[13,14] suggesting that music therapy primarily influences the affective component of pain

rather than nociception itself — an interpretation the present findings support, as women receiving music therapy continued to experience contractions but reported lower pain intensity and anxiety. Liu et al. similarly reported that music therapy improved coping and reduced anxiety, which in turn was associated with lower pain scores during contractions,^[15] reinforcing this anxiety-mediated pathway of pain reduction. Notably, the control group did not show a comparable improvement despite receiving routine care, suggesting the observed reductions were specifically associated with the intervention rather than habituation or passage of time.

Post-intervention analysis by parity and educational status revealed no statistically significant association with pain or anxiety outcomes in either study group. Although multigravida women and those with higher educational status showed modestly favourable trends, the beneficial effect of music therapy was observed consistently across parity and education subgroups, supporting its broad applicability across heterogeneous populations, including rural and resource-limited settings.

An important objective of the study was to evaluate the safety of music therapy with respect to maternal and perinatal outcomes. Maternal outcomes were uniformly favourable in both groups (100% in each), with no adverse maternal events, and perinatal outcomes were similarly good in both groups with no adverse neonatal outcomes recorded. This safety profile is consistent with earlier reports: Simavli et al. found that music therapy during labour did not affect uterine contraction patterns or mode of delivery while reducing pain and anxiety without adverse maternal or neonatal effects,^[13,14] and Indian data from Xavier and Viswanath similarly demonstrated no impact on uterine activity or labour complications alongside significant improvement in pain and anxiety.¹⁰ Baseline and post-intervention physiological parameters such as pulse rate and blood pressure were comparable between groups, further supporting the conclusion that music therapy exerts its effects centrally through emotional and cognitive modulation rather than through alteration of autonomic or cardiovascular function.

Strengths and Limitations

- Prospective interventional comparative design with a balanced sample of 200 participants (100 per group), providing adequate power to detect meaningful between-group differences.
- Well-established baseline equivalence across socio-demographic, obstetric, physiological, and baseline pain/anxiety parameters, strengthening internal validity.
- Use of standardized, validated outcome tools (VAS for pain, GAD-7 for anxiety) with both within-group and between-group analyses, including subgroup analyses by parity and educational status.
- Purposive (non-random) sampling without blinding may introduce selection and observer

bias, particularly for subjective outcomes such as pain and anxiety.

- A single 30-minute music session without standardization of music type, tempo, or genre; labour duration, mode of delivery, and long-term postnatal psychological outcomes were not analysed in detail; single-centre design may limit generalisability.

CONCLUSION

This study shows that music therapy is an effective and safe non-pharmacological adjunct for reducing pain and anxiety during the active stage of labour. Women who received music therapy experienced significantly lower pain and anxiety levels than those receiving routine care alone, with the reduction in anxiety more pronounced than the reduction in pain, suggesting that music therapy primarily acts through emotional modulation and improved coping during labour. This beneficial effect was consistent across parity and educational groups, and music therapy did not adversely affect maternal or perinatal outcomes, confirming its safety. Owing to its simplicity, low cost, and non-invasive nature, music therapy can be integrated into routine intrapartum care to enhance maternal comfort and improve the overall childbirth experience, particularly in settings where pharmacological analgesia is limited.

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