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Original Research Article

Music: an effective anxiolytic during caesarean section under spinal anaesthesia

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ABSTRACT

Background: Parturient undergoing repeat caesarean section (CS) under spinal anaesthesia usually experience anxiety due to unpleasant operative environment. Music therapy has been found to have positive psychological impact to relieve anxiety, improve patient satisfaction and provide stable haemodyanamics.
Methods: Sixty patients without any co morbidity having history of previous CS, scheduled for another caesarean under spinal anaesthesia were included in the study. Patients were divided into two groups of 30 each. Group(M) patients were subjected to hearing music of their choice with the help of headphones after administration of spinal anaesthesia till the end of surgery. Group(N) patients were not made to listen to any music but headphones were applied. Haemodyanamic parameters including mean arterial pressure (MAP) and heart rate (HR), visual analogue score for anxiety (VASA) after administering spinal block and at the end of surgery, patient satisfaction score (PSS) and comparison of anxiety with previous CS were observed and recorded.
Results: Both MAP and HR in Group M started falling after 10 minutes of spinal anaesthesia as compared to Group N and difference was significant (P <0.005), VASA 2 (2.2±1.8) in Group M was significantly lower than VASA 1 (5.4±1.7). PSS was also in favour of music group (Group M) and difference was highly significant as compared to group N (p=0.018). Patient's anxiety as compared to anxiety with previous CS was lesser in Group M as compared to Group N(p=0.009).
Conclusions: Music is a non-invasive tool to relieve anxiety during intraoperative period along with higher patient satisfaction and stable haemodyanamics.

Keywords: Anxiety, Caesarean section, Music, Patient satisfaction, Pregnancy

INTRODUCTION

Women undergoing repeat caesarean section (CS) usually experience anxiety due to previous surgical experience. Since regional anaesthesia is used, patient remains awake and is exposed to several auditory and visual stimuli inside the operating room.[1]

Anxiety has negative impact on the psychological wellbeing of the patient. In addition, it leads to delayed postoperative recovery, slower wound healing, disturbed haemodynamics, lower immunity and high rate of infections. Additionally, CS is also associated with hormonal imbalances leading to postpartum depression.[2]

Various known pharmacological modalities like anxiolytics, sedatives and anaesthetic agents are popularly in use to manage such situations. However, many adverse effects like circulatory and respiratory depression are also to be taken into consideration. Music is a known non-pharmacological method to reduce anxiety as shown by various researchers.[1-3]

Authors have found it to be cost effective and safe adjuvant to regional anaesthesia.[4] Studies have shown that relaxing music has positive psychological effects and can relieve perioperative pain, anxiety, and haemodynamic stability of patients under anaesthesia.[5]

Primary objectives of this prospective randomised case control study was to observe haemodynamic parameters including HR and MAP as well as visual analogue score for anxiety (VASA).

Secondary aims included patient satisfaction score (PSS) and comparison of patient's anxiety with previous CS.

METHODS

This randomized case control study was conducted at SMS medical college and attached group of hospitals, Jaipur (Rajasthan) in August 2018 to October 2018 after institutional ethical committee approval. Sixty pregnant women with no co- morbidity, having history of previous caesarean section scheduled for another caesarean delivery under spinal anaesthesia were enrolled for study. Sample size was calculated in concordance with statistician keeping in view of primary objective like haemodynamic and anxiety score to keep the power of study >80%.

Exclusion criteria

- Patients who refused to listen to music,
- Having hearing abnormality belonging to family of musicians,
- Having chronic pain syndrome,
- History of head and neck surgery,
- Having mental or psychiatric disorders and
- Having history of previous caesarean section more than 5 years back

Thorough preanaesthesia examination was done. After arrival in the preoperative room, patients were randomly divided in two groups, group M (interventional group who were made to listen to music) and group N (no music group who did not listen to music).

Music type and volume were selected in the preoperative room according to patient's choice. Preoperative status was recorded which included baseline parameters like blood pressure (BP) and HR. Written informed consent in vernacular language of patient was taken after explaining about study and procedure. All patients of both the groups were explained about Visual Analogue Scale for anxiety (VASA) in detail, which consists of 0 to 10 cm horizontal line where 0 stands for no anxiety and 10 stands for worst anxiety.

After taking the patient in operating room (OR) standard monitoring was attached. BP, HR, oxygen saturation (SPO2) and electrocardiogram (ECG) were recorded.

After all aseptic precautions patient was administered spinal anaesthesia (SA) using Injection (in) Bupivacaine heavy 0.5% 2 ml in sitting position inj. L2-L3 or L3-L4 intervertebral space. Patient was made to lie supine and level of block was checked.

After successful anaesthesia, anxiety score was recorded at this stage (VASA 1). Headphones were applied to all patients of both groups from this time till end of surgery. Group M patients were made to listen music of their choice while Group N patients received no music. Haemodynamic parameters like HR and MAP were recorded every 5 minutes (min).

At the completion of surgery, headphones were detached and patient anxiety score was recorded again (VASA2). After shifting of patient to recovery room patient satisfaction score (1- Highly satisfied, 2- Fairly satisfied, 3- Unsatisfied) was recorded.

All the patients were asked to compare the anxiety in this surgery with anxiety during previous CS.

Statistical analysis

Sample size was calculated taking in account the primary aims to detect the significant difference between two groups with alpha error of 0.05 and power of study 80%. Data was analysed with software SPSS (statistical package for social sciences) version 23.0 Quantitative data was analysed by Student t test and qualitative data by Chi square test. P value less than ≤0.05 considered statistically significant.

RESULTS

In this prospective randomised control trial, we compared the demographic profile, haemodynamic parameters (MAP, HR), visual analogue scale for anxiety, patient satisfaction score and patient anxiety as compared to previous caesarean section, between study (M) and control (N) groups.

Table 1: Comparison of demographic profile.

characteristics	Music group M	Non music group N	P value	
Age	28.7±5.3	28±4.2	0.570	NS
Weight	61.3±12.8	56.9±10	0.156	NS
Duration of surgery	50.7±12	50.5±11.5	0.175	NS

NS- non-significant

The demographic profile of both groups which included age and weight were equivocal with no significant differences (p value for age = 0.57 and for weight = 0.156; non-significant) (Table 1). Mean duration of surgery in both groups was around 50 minutes (50.7±12 minutes in Group M and 50.5±11.5 in Group N. This

difference was found to be non-significant (p=0.175) (Table 1). On comparing the haemodynamic parameters, MAP and HR in both groups preoperatively and just after administering spinal block were comparable.But after 10 minutes of spinal anaesthesia these parameters started falling more in Group M as compared to Group N and the difference was found to be significant till after the end of surgery (p <0.05) (Tables 2 and 3).

Table 2: Comparison of MAP.

Time (min)	Music group M	Non music group N	P value	P value
Pre op	97.4±14.4	98.5±12.2	0.751	Non significant
0 (after spinal)	85.8±11.1	92±14.4	0.070	Non significant
5	78.5±12.7	85.9±17.6	0.066	Non significant
10	82.2±11.2	89.8±13.1	0.018*	significant
15	81.4±11.9	91.4±12.4	0.002*	significant
30	82.4±10.6	88.7±12.2	0.037*	significant
45	82.8±11.8	89.1±9.8	0.028*	significant
60	80.1±12.9	92.9±11.5	0.024*	significant

* Significant p value

Table 3: Comparison of HR.

Time (min)	Music group M	Non music group N	P value
Pre op	98.5±12.2	97.4±14.4	0.751
0 (after spinal)	92±14.4	85.8±11.1	0.700
5	85.9±17.6	86±12.7	0.979
10	80±13.1	88±11.5	0.014*
15	78±14	86±11.6	0.019*
30	76±12	88±12.2	0.003*
45	74±10	86±14.1	0.003*
60	74±12	84±12	0.002*

* Significant p value

Visual analogue scale for anxiety was studied for both the groups. After application of music of choice in-Group M, VASA 2 fell to a much lower value than VASA 1. VASA 1 (5.4±1.7) fell to VASA 2(2.2±1.8). However, in Group N, VASA 1 was found to be 5.7±1.3 and it fell after the completion of surgery (VASA 2 = 3.4±1.3). On comparing VASA between two groups, we found that VASA were lower in Group M after surgery (VASA 2) as compared to Group N. This difference was found to be significant between both groups (p = 0.004) (Table 4)

Patient satisfaction score was also assessed in both the groups in the recovery room. 14 out of 30 patients in-Group M and 4 out of 30 in-group N were highly satisfied. 13 out of 30 in Group M and 22 out of 30 in Group N were found to be fairly satisfied. This difference between two groups in highly significant (p =0.018) and goes in favour of music therapy (Table 4)

Authors also compared patient anxiety during this surgery with anxiety in the previous caesarean section. We found that 22 out of 30 cases in M group and 11 out of 30 cases in N group were lesser anxious during this surgery, favouring the application of music. This difference in values were highly significant (p = 0.009) (Table 4).

Table 4: Comparison of VASA, PSS and anxiety.

Variable		Music group M	Non music group N	P value
VASA	VASA 1	5.4±1.7	5.7±1.3	0.521
	VASA 2	2.2±1.8	3.4±1.3	0.004*
PSS	I	14(46.7%)	4(13.3%)	0.018*
	II	13(43.3%)	22(73.4%)	
	III	3(10%)	4(13.3%)	
Anxiety	Less than previous CS	22(73.3%)	11(36.7%)	0.009*
	More than previous CS	8(26.7%)	19(63.3%)	

*Significant p value

DISCUSSION

Music has been shown to elevate the mood have a positive impact on psychology of patients. Various authors have studied the favourable effects of music on anxious patients, regarding, anxiety scores, patient's satisfaction level, hormonal - neurotransmitter levels and reduced doses of sedatives and analgesics.[1-10]

Researchers have quoted various mechanisms, which include release of neurogenic endorphins by music helping to decrease the anxiety and stress.

In addition, music has been shown to cause reduction in pain and decrease in analgesic requirement.

Under regional anaesthesia (RA), various visual and auditory stimuli (noises, person and equipments) present in the operating room (OR) disturb the patient and elevate anxiety. Music plays a positive role in curbing these negative feelings. However loud music played in OR may impair communication among or staff and also music may not be of patient choice. Therefore, application of headphone has been advised as an effective solution.[11]

In present study, authors compared two groups of patients for repeat caesarean sections by application of music in one group and silence in the other group. Various parameters like haemodynamic, anxiety score, patient satisfaction score and patient's haemodynamic as compared to previous caesarean section were evaluated.

On comparing MAP preoperatively and just after spinal anaesthesia there was no significant difference in two groups. However, 10 min after SA the MAP in music group started falling consistently as compared to the N group till post-operative period and this difference was significant.

Present study results show concordance with various other researches in this respect showing a decrease in blood pressure (BP) when patients were allowed to select music of their choice.[12,13]

Kahloul et al, showed greater haemodynamic stability in patients administered music as compared to control group.[10]

Binns- Turner PG et al, also showed similar effect on MAP as our study.[14]

Bradt J et al, reviewed 23 trials in this respect and concluded that music has beneficial effect on reducing BP, HR, respiratory rate, anxiety and pain in patients with coronary heart disease.[15]

Tsuchiya M et al, studied the effect of music on patients under general anaesthesia and concluded that music blunts haemodynamic responses during extubation.[16]

Another recent study also showed similar effect on haemodynamics in patients undergoing cataract surgery under local anaesthesia.[17]

Sarkar et al, and Bansal et al, showed results contrary to ours with no changes in BP using music.[1,2]

On observing HR between both groups, we found the profile to be similar to MAP with lower heart rate levels in Group M starting from ten minutes after administering spinal till end of surgery.

Various authors have found their results in concordance to ours. Bansal et al, and Laopaiboon M et al, found significant decline in mean HR by using music intra operatively. Various other authors also quoted similar results.[1,18,19]

Wang Y et al, studied the effect of music on elderly patients under SA and demonstrated a reduction in HR and anxiety. They stated that anxiety leads to activation of sympathetic system causing stimulation of hypothalamic autonomic system and rising of heart rate, which is slowed down by music due to reduction in anxiety.[9]

Other recent study by Kahloul M et al, on patients under general anaesthesia (GA) also showed lowering of HR with music.[10]

Shu MW et al, and Ebneshahidi A et al, in their studies did not find any change in HR between music and control groups which is contrary to our study results.[20,21]

We studied visual analogue scale for anxiety in both the groups. Fall in values of VASA in both groups were observed at the end of surgery. However, on comparing, VASA in Group M were of a much lower value than in Group N. This difference was statistically significant. ($p = 0.004$) The fall in VASA 2 in Group N could be due to silencing of OR noises by application of headphones even though music was not switched on.

Reduction in anxiety due to music (Group M) has been shown to be caused by activation of auditory pathways and limbic system. These inter communicate with hypothalamus, reticular activating system and hippocampus to attenuate excitatory neurotransmitters leading to relaxation and sedative effects. In addition, rhythm and beats of music lead to distraction of brain and calming effect on body, which is enhanced by music of patient choice.[1]

This mechanism of relaxation response due preferred music may be by activation of parasympathetic system.[3] Studies have shown role of patient selected music in attenuating anxiety of unfamiliar environment.[1,21] This has been shown by our study also.

Siedliecki SL et al, stated that most important factor in enhancing relaxation is how much the patient likes the music.[22] Thus, lays the importance that age, culture, socioeconomic status lies and religion may affect response to music in unfamiliar environment.[23]

A number of studies have quoted results similar to ours with respect to anxiety.

Wang et al, and Palmer et al, showed significant reduction in anxiety scores in patients receiving music.[3,24]

Kurdi M et al, concluded in their recent study on patients with caesarean sections that anxiety scores differ significantly between music and control group at 1, 6, and 24 hrs.[25]

Chang SC et al, found lower anxiety and higher patient satisfaction during caesarean sections with application of music.[26]

Bringman H et al, demonstrated more reduction in level of anxiety with music as compared to oral midazolam in elective ambulatory surgeries.[27]

Bansal et al also demonstrated lesser requirement of midazolam in their music group for achieving similar sedation score as in group without music.[1]

Wang Y et al, also observed similar results as ours by use of music in elderly patients.[9]

On studying the patient satisfaction score in recovery room, we observed that more number of patients in Group M were highly satisfied (grade 1) than patients in Group N. This difference was found to be highly significant in favour of Group M. Sarkar et al, in their study found that maternal satisfaction score was very high in their music group as compared to silence group in patients undergoing caesarean sections.

Laopaiboom et al, in their systemic review found that patient satisfaction sore increased by 3.4 points on 35 points scale with use of music score.[18]

Music has been shown to be highly desirable in patients undergoing conscious sedation and RA by decreasing the consumption of sedatives and improving the patient's satisfaction.[6,28,29] However Palmer et al, found no difference in patient satisfaction with music from those with no music on ambulatory surgery for breast cancer patients.[3]

Various authors have studied the levels of hormones and neurotransmitters secreted while listening to music. They showed that music promotes lowering of hormone levels like Cortisol, Adrenocorticotrophic hormone (ACTH) and Catecholamines.[6,24,30,31]

Also, plasma levels of oxytocin have been seen to increase with music therapy, which has a boosting effect on psychological condition of the parturient. Serotonin levels have been shown to increase with light music having a positive effect on pain relief, stress and anger.[30]

Limitation of our study was that we could not assess change in levels of various hormones involved in stress response of patients due to music therapy.

CONCLUSION

Music is a non-invasive and non-pharmacological interventional tool, which is effective in intra-operative setting to achieve haemodynamic stability, lesser anxiety and higher patient satisfaction in parturient undergoing caesarean sections.

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