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Original Research Article

Evaluation of music interventions for anxiety during dermatosurgery under local anesthesia

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ABSTRACT

Background: Music is a safe, non-invasive and affordable adjunct to office surgery with several studies based on the effect of music on anxiety levels in varying age groups proving beneficial. The main aim of the current study was to evaluate the effect of music intervention on the anxiety levels of patients going through dermato-surgery under local anesthesia.
Methods: Participants (n=150) undergoing dermato-surgery were divided equally as control (no music intervention) and experimental group (music intervention). The demographic data, physiological parameters (blood pressure (BP), heart rate (HR) and respiratory rate (RR)) at varying time intervals (baseline, 10 minutes after the commencement of surgery and 20 minutes after the end of surgery) along with the psychological parameter (anxiety) were recorded.
Results: Participants listened to the music of their interest during surgery. The anxiety levels decreased significantly within both the experimental and control groups at varying time intervals ($p<0.0001$). Within each group, BP, HR, and RR at all time intervals were statistically significant ($p<0.0001$). On comparing the control and experimental groups, only systolic BP at all time intervals was statistically significant ($p<0.05$). A negative correlation was observed in RR at 10 minutes with respect to interest in music and social avoidance; at 20 minutes only with interest in music ($p<0.05$).
Conclusions: The anxiety level of patients going through dermato-surgery under local anesthesia was reduced due to music intervention at varying time intervals.

Keywords: Music, Anxiety, Blood pressure, Heart rate, Respiratory rate

INTRODUCTION

Surgical patients worldwide often suffer from significant pre- and post-operative anxiety. Data suggest that approximately 75% of patients are anxious despite taking precautionary anxiety decreasing measures.[1,2] World health organization (WHO) has estimated 266-360 million surgical procedures performed annually worldwide.[3,4]

Many studies have reported that the dosage level of anesthesia has been increased to reduce the anxiety levels of patients which could result in untoward side effects.[5,6] Visual therapy, journaling, scheduling of pleasant activities, meditation and skills training are few other techniques used to improve the psychological status of a patient. As an alternative to promote the safety aspects of patients, many branches in the medicinal field including general surgery, cardiology, pulmonary medicine and neurology have found the use of music therapy, also

referred to as music medicine, efficacious in comparison to low doses of anti-anxiety medication.[7-9] Music therapy has been used in cognitive treatments resulting in a significant modification of the psychological status.[10,11] Also, studies suggest that giving the patients a choice of music, lowers anxiety and promotes relaxation.[12]

With respect to dermato-surgery procedures, it so happens that patients anticipate or experience pain/discomfort by the procedure level. For example, electrosurgery involves the passage of current for ablation, a skin biopsy involves removal of a skin sample up to the subcutaneous fat to evaluate the pathological condition of the skin lesion and intra-lesional steroids require multiple sessions which are painful which in turn increases fear or anxiety in a patient.

There are very few reports of using music intervention in dermato-surgeries to reduce anxiety levels. Hence, the current study was mainly aimed to evaluate if listening to music reduces anxiety levels in patients undergoing invasive dermato-surgery under local anesthesia in a tertiary care hospital, and thereby allowing rigorous assessment of the effect of music on anxiety during various dermato-surgeries.

METHODS

Study design

The current prospective intervention study was conducted at the department of dermatology, venereology and leprology (DVL) along with the department of psychiatry and CMTER (centre for music therapy education and research). The study was conducted between December 2015 and January 2018 after obtaining approval from the Institutional ethics committee.

Study subjects and selection criteria

The participants who were diagnosed with different dermatological diseases requiring invasive dermato-surgery to be performed under local anesthesia were first selected. The main criteria for selecting participants for the current study was their interest in music and a total of 150 of them were included. Participants above 18 years of age gave informed consent and the consent was approved by the parent/guardian for those below 18 years of age. Patients who were hard of hearing, undergoing psychiatric treatment, on medication for hypertension and those not interested in listening to music were excluded. The sample size was selected as per the G power computer program.[13]

Based on their interest in listening to music during surgery, the study population was divided into 2 groups - control (n=75), where subjects underwent surgery without any music intervention and experimental (n=75), where subjects underwent surgery along with music intervention.

Study procedure

The playlist for the study was prepared in consultation with CMTER and the choice of music genres in the regional language, Tamil, provided to the patients included chants, devotional, film and instrumental classical music. The interest in music (IiM) among patients was tested as per the IiM scale, which has an internal consistency between 0.89-0.77 and reliability between 0.61-0.85.[14] Headphones were used for patients where they could choose the music of their interest. Once the patient requirements were set, local injectable anaesthetic LOX 2% adrenaline, which contains lignocaine hydrochloride and adrenaline bitartrate, was administered and after 5 minutes, the surgery and music were started simultaneously along with the timer. The physiological parameters (systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR) and respiratory rate (RR)) were recorded at varying time intervals such as the baseline i.e. before the commencement of the surgery, after 10 minutes of the commencement of the surgery and 20 minutes after the end of surgery. Duration of music during the surgery and termination of music after the end of surgery was as per patient's willingness. Anxiety levels were also measured at varying time intervals as per the Likert anxiety scale within the two groups.[15] The outcome variables were recorded by the principal investigator.

Statistical analysis

The statistical analysis to compare the parameters within and between the groups was done using R v386 3.6.0 using Wilcoxon rank-sum test, Friedman's test, Kendall correlation and Kruskal Wallis test. Values are represented as mean ±SD, $p \leq 0.05$ was considered as statistically significant.

RESULTS

Demographic and treatment particulars of study participants

The age of the study participants ranged between 15-70 years with a mean age of 38.7±12.9 and 35.1±13.4 years in control and experimental group respectively. With 75 participants in each group, a higher number of participants belonged to the age group of 20-29 and 40-49 years (28% each) in the control group, whereas 36% of them in the experimental group belonged to the age group of 20-29 years. With respect to the gender distribution, 53.33% and 46.67% of male and female participants in the control group respectively and 56% and 44% of the same in the experimental group were involved in the study.

The different dermato-surgery treatments involved in the current study include electrocautery, intralesional steroids, radiofrequency cautery, skin biopsy, skin excision, CO_2 laser, platelet-rich plasma injections, derma

rolling and subcision for acne scarring. A higher number of patients in the control group were for intralesional steroid therapy (33.33%) followed by electrocautery (18.67%) whereas in the experimental group, the higher number of patients were for electrocautery (29.33%) followed by intralesional steroid therapy (24%). A majority (82.66%) of the patients in the experimental group preferred Tamil film music to be played during the surgery with a mean duration of listening to music was 41.73±5.89 minutes.

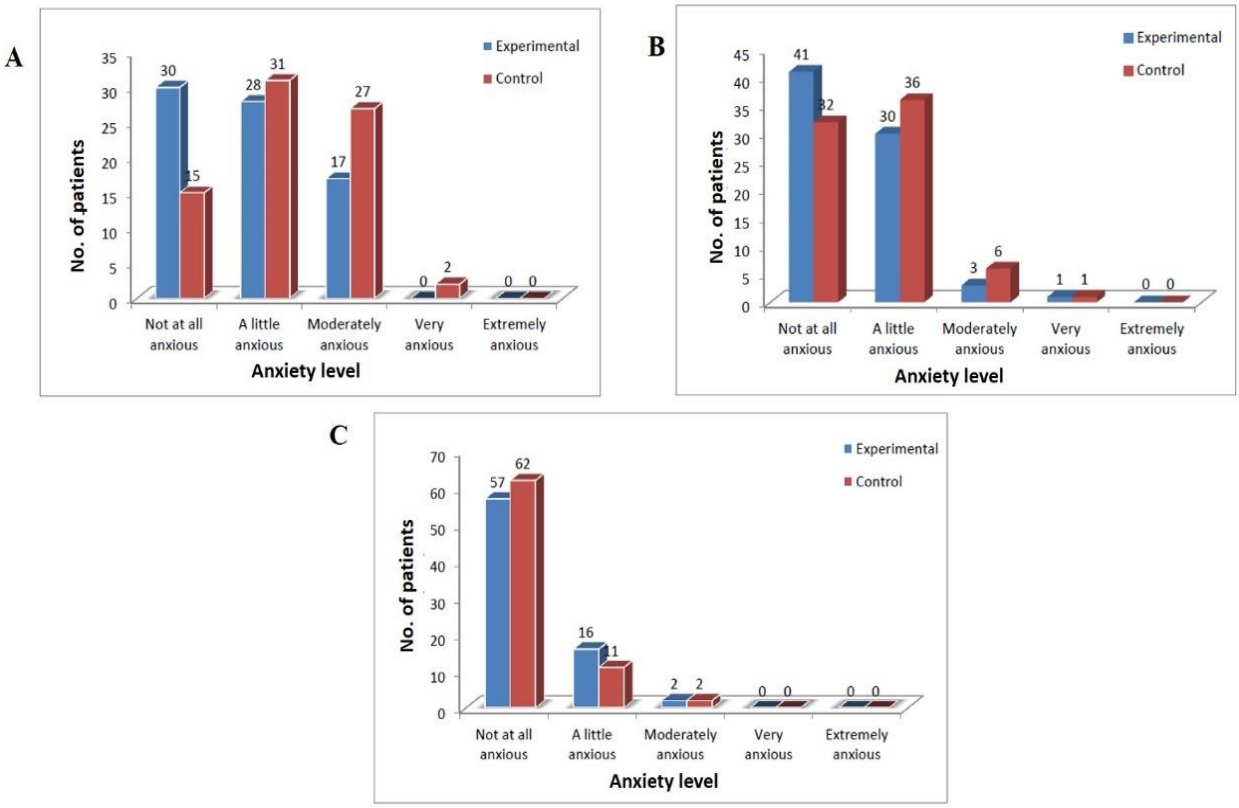

Figure 1: Comparison of anxiety levels between the control and experimental groups at (A) baseline, (B) 10 minutes, and (C) 20 minutes.

Table 1: Comparison of physiological parameters and anxiety at different time intervals in experimental and control groups.

Parameter	Time interval	Experimental group		Control group	
		Mean±SD	P value	Mean±SD	P value
SBP (mmHg)	Baseline	121.08±6.67	<0.0001	117.60±8.0	<0.0001
	10 minutes	122.35±6.94		122.05±7.72	
	20 minutes	117.53±6.53		119.01±6.99	
DBP (mmHg)	Baseline	76.64±6.32	<0.0001	76.19±6.84	<0.0001
	10 minutes	77.06±7.0		78.0±6.77	
	20 minutes	74.69±6.46		76.0±6.57	
HR (beats/min)	Baseline	69.45±6.45	<0.0001	67.29±5.17	<0.0001
	10 minutes	69.51±5.98		69.03±4.60	
	20 minutes	67.25±5.97		67.48±5.42	
RR (breaths/min)	Baseline	16.68±2.46	<0.01	15.45±2.07	<0.0001
	10 minutes	16.94±2.42		16.61±1.78	
	20 minutes	16.29±2.82		15.53±1.94	
Anxiety	Baseline	1.83±0.77	<0.0001	2.21±0.79	<0.0001
	10 minutes	1.52±0.64		1.68±0.68	
	20 minutes	1.26±0.50		1.20±0.66	

Anxiety levels in the experimental and control groups

At the baseline assessment, 30 patients were 'not at all anxious' followed by 28 patients who were 'a little anxious' in the experimental group whereas 31 and 27 patients were a 'little' and 'moderately anxious' respectively in the control group (Figure 1A). After 10 minutes through the surgery, 41 patients were 'not at all anxious' followed by 30 patients who were 'a little anxious' in the experimental group. Similarly, 32 patients were "not at all anxious" and 36 patients were "a little anxious" in the control group (Figure 1B). The anxiety levels of patients 20 minutes after the end of surgery decreased in the experimental group with 57 out of 75 patients and in the control group, 62 out of 75 patients displaying no anxiety at all (Figure 1C).

With respect to comparing to the physiological parameters within each group, there was a significant difference observed in all the parameters (SBP, DBP, HR, and RR) with p value <0.01 in the experimental group and p value of <0.0001 in the control group at all time intervals. Within each group, a significant difference in the anxiety scores at all time intervals was observed with a p value of <0.0001. However, the lowest anxiety score was observed at 20 minutes in both groups (Table 1).

Effect of music intervention on the physiological parameters between the experimental and control groups

The SBP measured between the two groups proved to be statistically significant (p=0.004) at baseline. With respect to DBP, there were no statistical significance observed in both groups at different time intervals (p>0.05). Statistical significance of p=0.025 was observed for HR between the two groups at the baseline. Similar observations were noted for RR, having a significant difference at baseline (p=0.003). At 10-20 minutes time intervals, insignificant difference was observed with respect to both the study groups regarding all physiological parameters (Table 2).

The mean difference was statistically significant with respect to anxiety levels between the two groups from baseline to 20 minutes (p<0.001) and 10-20 minutes (p<0.01). The mean difference was statistically significant with respect to SBP between the two groups at all time intervals (p<0.05). The mean difference was statistically significant with respect to DBP between the two groups only at baseline - 20 minutes time interval (p<0.05). The mean difference of HR was statistically significant between the two groups at baseline-10 minutes (p<0.05) and baseline - 20 minutes time interval (p<0.01). The mean difference of RR was statistically significant between the groups at baseline - 10 minutes (p<0.01) (Table 3).

Correlation between interest in music and anxiety along with physiological parameters in the experimental group

Based on the interest in listening to music within the experimental group, the mean score of musical activity and emotional engagement with music was 36.96±3.33 and mean social avoidance through music score was 7.37±1.54 among the participants. However, there was insignificant difference in musical activity and emotional engagement with the music domain (p=0.58) and social avoidance through the music domain (p=0.8) between the two genders within the experimental group. Also, there was insignificant difference in musical activity and emotional engagement with the music domain (p=0.73) and social avoidance through the music domain (p=0.29) based on the age group as well.

Table 2: Comparison of physiological parameters between experimental and control group at different time intervals.

Physiological parameter	Time interval	Experimental (mean±SD)	Control (mean±SD)	P value
SBP (mmHg)	Baseline	121.08±6.67	117.60±8.00	0.004*
	10 minutes	122.34±6.94	122.05±7.72	0.46
	20 minutes	117.53±6.53	119.01±6.99	0.19
DBP (mmHg)	Baseline	76.64±6.32	76.18±6.84	0.46
	10 minutes	77.06±7.00	78.00±6.77	0.42
	20 minutes	74.00±6.46	76.00±6.58	0.34
HR (beats/min)	Baseline	69.45±6.45	67.29±5.17	0.025*
	10 minutes	69.50±5.98	69.02±4.60	0.82
	20 minutes	67.25±5.97	67.48±5.42	0.72
RR (breaths/min)	Baseline	16.68±2.46	15.45±2.07	0.003*
	10 minutes	16.94±2.42	16.61±1.77	0.70
	20 minutes	16.29±2.82	15.53±1.95	0.36

*p<0.05 (significant).

Table 3: Comparison of anxiety levels and the physiological parameters between experimental and control groups.

Parameter	Comparison	Mean difference		P value
		Experimental	Control	
Anxiety	Baseline- 10 minutes	0.306	0.533	0.054
	Baseline- 20 minutes	0.560	1.013	<0.001*
	10 minutes- 20 minutes	0.253	0.480	<0.01*
SBP (mmHg)	Baseline- 10 minutes	-1.26	-4.45	<0.001*
	Baseline- 20 minutes	3.54	-1.41	<0.0001*
	10 minutes- 20 minutes	4.81	3.04	<0.05*
DBP (mmHg)	Baseline- 10 minutes	-0.42	-1.813	0.155
	Baseline- 20 minutes	1.94	0.186	<0.05*
	10 minutes- 20 minutes	2.37	2.00	0.60
HR (beats/min)	Baseline- 10 minutes	-0.05	-1.73	<0.05*
	Baseline- 20 minutes	2.20	-0.186	<0.01*
	10 minutes- 20 minutes	2.25	1.54	0.23
RR (breaths/min)	Baseline- 10 minutes	-0.26	-1.16	<0.01*
	Baseline- 20 minutes	0.38	-0.08	0.07
	10 minutes- 20 minutes	0.65	1.08	0.14

*p<0.05 (significant).

The result of patients' interest in music on anxiety levels was not statistically significant (p=0.067) and a negative correlation was observed with respect to anxiety and social avoidance through music with a p value of 0.032 at 10 minutes. The correlation was statistically insignificant at various time intervals between interest in music and SBP, DBP and HR in the experimental group (p>0.05). However, a negative correlation was observed in RR at 10 minutes with respect to interest in music (p=0.039) and social avoidance (p=0.004) and at 20 minutes with respect to interest in music (p=0.007).

DISCUSSION

Anxiety is a biological response that prepares the body to react to potentially harmful stressors accompanied by certain cardiorespiratory autonomic changes. The mechanisms initiated to prepare the individual to combat stress by increasing BP, HR and RR. Earlier studies have indicated that in normal non-anxious individuals, the initial response is stronger than in those with anxiety disorders. However, the return of physiological parameters to baseline occurred rapidly in non-anxious individuals upon terminating the stressor.[16] Music plays a vital role in self-regulation and is considered as a stress-coping mechanism that helps in diversion, self-reflection, emotional regulation and social bonding. While listening to the music of our choice, stress reduction and enrichment of relaxation offers a distraction from pain and thereby enhance clinical outcome.[17] The current study was performed to present the patients an opportunity to listen to music while undergoing dermato-surgery under local anesthesia, a simple strategy to minimize anxiety.

In the study, although anxiety levels decreased significantly within both the experimental and control groups at varying time intervals, difference in the anxiety levels between the two groups was statistically insignificant, which could be due to the fact that the anxiety levels measured with Likert scale is respondent dependent, which could be an unavoidable bias. Also, anxiety levels amongst the study participants were not homogenous at the baseline levels. A similar observation was documented in an earlier study.[18] Avoidance of headphones by certain participants and a shorter duration of time regarding music listening could also be a reason for the statistical indifference. Similar findings were observed in a study with patients undergoing gastrointestinal endoscopy along with music intervention along with a decrease in the physiological parameters such as blood pressure and saturation oxygen pressure considered during the study. Different genres of music as per the patient's requirement further aid in decreasing the anxiety levels.[19] The participants in this study preferred Tamil film music.

With the intervention of drugs or any other relaxation technique, an individual's perception of anxiety reduces even further than the actual change in the physiological parameters.[20] In the experimental group, there was a decrease in the mean SBP from a baseline of 121.08±6.67 mmHg to 117.53±6.53 mmHg, mean DBP from 76.64±6.32 mmHg to 74.0±6.46 mmHg, mean HR form 69.45±6.45 beats per minute to 67.25±5.97 beats per minute after the surgery with the mean RR unaltered at all three time periods. With respect to the control only, a slight increase in the mean SBP from a baseline of 117.60±8.0 mmHg to 119.01±6.99 mmHg post-surgery was observed but mean DBP, HR, and RR remained unaltered. The decrease in the mean SBP, DBP, and HR in the experimental group concludes that the music being played during surgery had a positive effect in reducing the anxiety levels of patients. Similar results were

observed in a study conducted on children and adolescents undergoing surgery with music intervention reflecting that listening to music has a positive effect on all age groups with respect to reduction in the anxiety levels.[6,21] Music intervention during any type of surgery performed not only reduces anxiety, but also pain and stress levels.[4,22,23] Earlier studies with patients undergoing surgery under general anesthesia that included music intervention intraoperatively or postoperatively, also resulted in a reduction in the anxiety levels.[24,25]

The current study showed that all physiological parameters decreased significantly post music therapy ($p<0.01$). Between the groups, statistical significance was observed only at the baseline level of SBP ($p=0.004$), HR ($p=0.025$) and RR ($p=0.003$) and not at all time intervals. Therefore, the assessment of physiological parameters showed a decrease in BP, HR and RR 20 minutes after the end of surgery in the experimental group. Comparing the mean difference between the two groups, SBP in the experimental group had a higher difference that was statistically significant at all time intervals ($p<0.05$). With respect to DBP, a higher mean difference was observed at baseline- 20 minutes in the experimental group that was statistically significant ($p<0.05$). A higher mean difference in HR was statistically significant at baseline- 20 minutes ($p<0.05$) and baseline- 10 minutes ($p<0.05$) in the experimental group. A higher mean difference in RR was statistically significant at baseline - 10 minutes ($p<0.01$) in the experimental group. Similar observations were recorded from studies involving music intervention during surgery with promising results in the reduction of anxiety levels post-surgery.[25-27] On comparing the mean difference of anxiety levels between the two groups, a higher difference was observed in the control group but was statistically insignificant at baseline - 10 minutes time interval but was statistically significant ($p<0.01$) at baseline - 20 minutes and 10 minutes - 20 minutes. This could be due to the baseline anxiety levels being dissimilar between the two groups and also by giving the patients a choice to choose the music from the list provided to them rather than allowing them to choose a music genre of their personal choice in the experimental group.

Few investigators also claim that passive listening to music by itself can raise HR, BP and RR depending on the tempo of the music played which explains non-significance within the two groups with respect to reduction in anxiety levels.[20,28,29] In the current study though, care was taken to provide patient preferred music. Though anxiety levels were lowered at the end of surgery in control group due to general adaptation, further investigation is required on the basis of the different dermato-surgeries performed and patient's awareness of the steps in the dermato-surgical procedure they underwent along with the duration and type of music that needs to be included in the study.

CONCLUSION

The current study indicates a reduction in anxiety levels in both groups. Music intervention has effectively contributed to a reduction in anxiety levels that was evident from the physiological parameters assessed. However, studies with larger sample size have with longer duration of listening to music appropriately chosen by the patient should be considered in the future.

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