

Effect of Music on the Vital Signs and Behaviour of Children During the Recovery Period after General Anaesthesia Procedure - A Randomized Controlled Trial

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Abstract

Background: Music has been suggested as a complementary treatment and this study evaluates the effect of music listened to on the vital signs and behaviour of children during the recovery period after day surgery.

Study design: This study followed a randomized controlled design which involved a total sample size of 62 children randomly assigned into 2 categories- experimental group (31) and control group (31). In both the groups pulse rate, diastolic blood pressure, systolic blood pressure, oxygen saturation, respiratory rate and the mean behaviour score before and after music therapy as well as the surgical procedure were evaluated. Frankl's behaviour rating scale was used to evaluate the behaviour.

Results: Children who listened to music during the recovery period demonstrated a more positive behaviour than the group who did not listen to music. The experimental group exhibited a significantly lower value in relation to pulse rate, diastolic blood pressure, systolic blood pressure and behaviour rating score and a significantly higher value in relation to oxygen saturation. ($p < 0.05$)

Conclusion: Music therapy can be considered as a complementary treatment method in children during the recovery period as it shows a positive effect on behaviour, pulse rate, oxygen saturation, diastolic and systolic blood pressure.

Keywords: Music, behaviour, child, vital signs, day surgery

Introduction

Music has been found to have health and/or wellbeing benefits across a large spectrum of practices from community choir participation to its use in waiting rooms and surgical settings as background music, both to directly influence mood and arousal levels and to distract from other unpleasant thoughts and feelings. Thus, engagement or even just exposure to music can play a

role in improving the mood, offsetting or masking pain and anxiety, playing a role in enhancing cardiovascular fitness and leading to a greater social integration.^[1]

Complementary treatment modalities aim to provide relaxation by the activation of sensory perception in addition to the moderating effect on some physiological indicators in patients. Besides, decreasing physiological indicators such as pulse rate, blood pressure and respiration, the relaxing effect can prove beneficial in controlling and preventing some intensive care-related complications such as sleep disorder, pain, and anxiety and behaviour related problems.^[2]

Music has been regarded as one of the complementary treatment methods^[3-5]. Music therapy drives individuals to express their emotions such as pain, stress and fear

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thus in-turn helps in meeting their physical, emotional and psychological requirements [6,7]. There has been an increasing body of evidence which suggests that music is beneficial in the moderation of pain, stress and anxiety, and may have financial as well as clinical benefits as opposed to more traditional interventions.^[1]

Several studies have stated that the vital signs and anxiety level of patients who listened to music in the post-operative period were lower and well controlled when compared to the control group.^[2,3] Since, anxiety directly or indirectly influences the child behaviour, the present study was conducted to evaluate the effect of music listened during the recovery period after pediatric day case surgery on the behaviour and vital signs of children.

Materials and Methods

This study was conducted in the department of Pediatric Dentistry in coordination with the Pediatric Surgery department and recovery room facilities of Saveetha Dental College and Hospitals, Chennai, India. The study design was reviewed and approved by the Institutional Review Board (SDC/PEDO-1704/19/014).

The study included 62 children who underwent day case surgery at the Pediatric Operation theatre between December 2019 and January 2020 after obtaining informed consent from the parents. This study followed a randomized controlled design which involved the effect of music listened during the recovery period after day case surgery under general anesthesia in the Pediatric Surgery department on the behaviour and vital signs of children. The sample size was arrived at 62 from a previous study^[2] with 90% power and randomly assigned into 2 categories- experimental group (31) and control group (31). Randomization was based on lottery method. Blinding could not be done in this study as there was an obvious visible differentiation.

The inclusion were as follows: 1) children between the ages of 4 to 6 years, 2) parents who understood the study and voluntarily agreed for their children to participate, 3) children who had to undergo day case surgery under general anesthesia at the Pediatric Operation theatre, 4) had not undergone any surgery before, 5) had not been diagnosed with a hearing impairment. The children with mental retardation or

special healthcare needs were excluded from the study.

In both groups, pulse, diastolic blood pressure, systolic blood pressure, oxygen saturation, respiratory rate and the mean behaviour score before and after music therapy as well as the surgical procedure were noted using a monitor and evaluated. Frankl's behaviour rating scale was used to evaluate behaviour.

Tables:

The classical music which was chosen to be listened to by the study group was "The Art of the Fugue" by Bach which is more than an hour and consists of 18 episodes. In that, the study group were made to listen to Contrapunctus Episode 3. This was preferred as the piece moves slowly and smoothly and has 4 sound bangs^[8]. All the participants of the study group listened to the music at the same volume with the same type of headphone and music player for 20 minutes during the recovery period. It was ensured that the headphones were externally covering all parts of the ear and filtering all external noise.

Procedure:

The study's protocol was approved by the Institutional Review Board of Saveetha Dental College and Hospitals. The participation was completely on a voluntary basis and it was informed that they could withdraw from the study any time before the study commencement. All queries were addressed and cleared before the commencement of the procedure.

Experimental group:

The parents and children were introduced to the music player and the headphones to be used, and informed that the patient should be wearing the headphone till they woke up completely. The pre-operative behaviour score and the vital signs were noted in the patient data form 15 minutes before the operation. In the post-operative period after the child had entered the recovery room after the operative procedure, the post-operative vital signs and behaviour score before listening to music were noted. After which, the child was made to listen to the chosen classical music using the headphones provided. They were made to listen to the music for 20 minutes until the doctors said that the child had woken up completely. The post-operative vital signs

and behaviour score after listening to music was then noted down in the same patient data form.

Control group:

The pre-operative vital signs and behaviour scores were evaluated and noted down in the patient data form 15 minutes before the commencement of the operation. The time when the patients entered back to the recovery room was noted and the post-operative vital signs and behaviour scores were recorded after the patient had completely woken up. The patients in this group did not listen to any music.

Statistical Analysis

The data were analyzed using SPSS software version 16.0.T -test was used for evaluation of the pre- and post-operative vital signs and behaviour rating scores respectively in the groups. The results were evaluated with a p value < 0.05 considered as significant.

Results

On analyzing the pre-operative group’s vital signs and Frankl’s scale score, there was no significant difference between the groups in relation to all the vital signs and behaviour rating score.(p<0.05 for each value)

On comparison of the post-operative vital signs in control group and in experimental group (after music therapy), a statistically significant difference was observed in terms of pulse rate, diastolic blood pressure, systolic blood pressure, oxygen saturation and behaviour rating score (p< 0.05). Experimental group exhibited a significantly lower value in terms of pulse rate, diastolic blood pressure, systolic blood pressure and behaviour rating score and a significantly higher value in terms of oxygen saturation. However, no significant difference in respiratory rate was observed between the two groups. [Table 1]

On analysis of the experimental group in terms of pre- and post intervention (i.e., before and after listening to music), in the post-operative period after entering recovery room, a statistically significant difference was observed in all the vital signs and in the behaviour rating score.(p< 0.05) After music therapy, there was a significant increase in oxygen saturation value whereas other vital signs observed in the study and Frankl’s score demonstrated a significantly lower value compared to the values recorded before music therapy post-operatively. [Table 2]

Table 1: Comparison of the control and experimental groups in terms of pre-operative vital signs and behaviour rating score and post-operative vital signs and behaviour rating score (after music therapy in experimental group)

Pre-operative values	Experimental group	Control group	p value
Pulse rate	96.35 +/- 7.85	95.55 /- 8.15	0.693
Diastolic pressure	57.77 +/- 7.60	59.16 + /- 5.76	0.422
Systolic pressure	96.06 +/- 7.00	95.81+/- 8.15	0.883
Respiratory rate	22.87 +/- 2.97	23.06+/- 2.58	0.785
Oxygen saturation	99.32 +/- 0.70	99.35+/- 0.70	0.858
Frankl’s scale score	3.55 +/- 0.57	3.55 +/- 0.57	1

Cont... Table 1: Comparison of the control and experimental groups in terms of pre-operative vital signs and behaviour rating score and post-operative vital signs and behaviour rating score (after music therapy in experimental group)

Post-operative(after music therapy)	Experimental group	Control group	p value
Pulse rate	98.77 +/- 6.57	105.81+/8.24	0.0004*
Diastolic pressure	57.16 +/- 8.49	69.65+/- 6.24	0.0011*
Systolic pressure	97.26 +/- 6.60	101.26+/- 7.38	0.028*
Respiratory rate	22.61 +/- 2.26	24.03+/- 3.50	0.063
Oxygen saturation	99.55+/- 0.50	98.87+/-0.92	0.001*
Frankl's scale score	2.87 +/- 0.499	3.74 +/- 0.44	0*

*p<0.05 statistically significant

Table 2: Comparison of the experimental group post-operatively in terms of vital signs before and after music therapy

Parameters	Before intervention	After intervention	p-value
Pulse rate	100.55 /-7.33	98.77 +/- 6.57	0.001*
Diastolic pressure	59.52 /-7.83	57.16 +/- 8.49	0*
Systolic pressure	99.03 /-6.68	97.26 +/- 6.60	0*
Respiratory rate	24.74 /-2.73	22.61 +/- 2.26	0*
Oxygen saturation	99.23 /-0.67	99.55+/- 0.50	0.001*
Frankl's scale score	3.84 /-0.37	2.87 +/- 0.499	0*

*p<0.05 statistically significant

Discussion

Audio distraction is a non-aversive technique in which patients listen to music or stories when undergoing a stressful procedure. Considering its success in medical settings and with adult dental patients, many pediatric dentists and parents believe that this technique can also be beneficial in children and in other procedure settings despite a lack of evidence to support its effectiveness in these settings [9]. Several studies have revealed that

listening to music decreased the level of anxiety, pain, analgesic need and stress hormone level of the patients [5,10-16]. At present, music is used in palliative care for therapeutic purposes, surgical procedures, paediatric departments, intensive care units, departments of psychiatry, oncology, gynaecology, coronary care, radiotherapy and chemotherapy procedures [5,7,17].

In the present study, no significant difference was observed in the pre-operative vital signs and behaviour rating in both groups. These findings suggest the similarity of the groups in our study. After the surgical procedure, and listening to music (experimental group), a statistically significant difference was observed in the pulse rate, diastolic blood pressure, systolic blood pressure, oxygen saturation and behaviour rating score, with the experimental group exhibiting a significantly lower value in relation to pulse rate, diastolic blood pressure, systolic blood pressure and behaviour rating score and a significantly higher value in relation to oxygen saturation. There was no significant difference in respiratory rate between the two groups. As the change between the groups was observed to be statistically significant, it was concluded that the music had a positive effect on the pulse rate, diastolic blood pressure, systolic blood pressure, oxygen saturation and behaviour. When pre and post intervention (listening to music) was compared after the surgery in the experimental group, a statistically significant difference was observed in all the vital signs and in the behaviour rating score. A significant increase was observed in the oxygen saturation value and a significant decrease in other vital signs - pulse rate, diastolic blood pressure, systolic blood pressure, respiratory rate and the Frankl's scale score after music therapy compared to before listening to music in the same group. This further emphasizes our study results and the positive effect of music.

According to previous studies done in this regard, results revealed that diastolic and systolic pressure were observed to be lower after listening to music^[5,11,16,18-21]. The results of the above studies are in accordance with our study results. However, in another study by Sabzevari et al., the systolic pressure was lower in the group which listened to music but there was no difference in the diastolic pressure.^[22]

Several studies have reported a positive effect on respiratory rate, with a lower value in experimental group compared to the control groups^[2,5,12,20,21]. In our study too, the respiratory rate was observed to be lower in the experimental group compared to control group but the difference was not statistically significant. Music is proven as an effective way to lower the stress of patients causing a positive behaviour outcome^[6]. This was in accordance with our study results showing a significant

positive behaviour outcome according to Frankl's scale score.

One of the limitations of this study was the small sample size of children. Thus, further studies are needed in this regard with a multi center based approach and a larger sample size. The music suggested by the children's parents or other relaxing music can also be evaluated for the same.

Conclusion

Music therapy produced a positive effect on the pulse rate, diastolic and systolic blood pressure and oxygen saturation values. Also, music listened during the recovery period had a positive effect on child's behaviour. Thus, it can be concluded that the music therapy can be used as a complementary treatment in children during the recovery period.

Conflict of Interest: None

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