



IMMEDIATE EFFECT OF VARIOUS TYPES OF MUSIC ON VITAL SIGNS IN INFANTS

Mandar Malawade¹, Namrata Patil²

^{1,2} Department of Pediatric Physiotherapy, Krishna College of Physiotherapy, KIMS, Karad , India 415110

Article Info: Received 02 December 2018; Accepted 02 January. 2019

Cite this article as: Malawade, M., & Patil, N. (2019). IMMEDIATE EFFECT OF VARIOUS TYPES OF MUSIC ON VITAL SIGNS IN INFANTS. *International Journal of Medical and Biomedical Studies*, 3(1).

DOI: <https://doi.org/10.32553/ijmbs.v3i1.74>

Address for Correspondence: Mandar Malawade, Associate Professor, Department of Pediatric Physiotherapy, Krishna College of Physiotherapy, KIMS, Karad , Maharashtra, India 415110

Conflict of interest: No conflict of interest.

Abstract

Overview: Infants experience stressors. Stress responses in infants include physiological responses (HR and oxygen saturation) and behavioral responses (behavioral state, motor activity, and signs of behavioral distress). Modulation of the stress response in infants may reduce energy demands and enhance recovery. The characteristics of auditory stimulation provided by music differ from those of other types of auditory stimulation. The infants respond differently to music than to other random noises. This study was carried out to examine the effects of different types of music on vital signs of infants.

Methodology: Thirty infants were included in the study. They were divided into two groups. Low and High pitched music was used with for two individual groups. The immediate effect was assessed through pre and post recordings for Heart rate, Respiratory rate and O₂ saturation level.

Results: There was statistically significant change in Heart Rate, Respiratory Rate and O₂ saturation individually. While comparing post data, except Heart Rate there was no significant difference found with both types of music.

Conclusion: Low pitched music has better immediate effect than high pitched music

Key words: High pitched music, Low pitched music, Infants

Introduction:

Infant is derived from a Latin word “infante” meaning “unable to speak”. Many define infancy as a period from birth to approximately 2 years of age, when language begins to flourish. It is an exciting period of firsts-first smile, first successful grasp, first evidence of separation anxiety, first word, first step; first sentence.¹ Developmental

milestones provide a systematic approach by which to observe the progress of the infant overtime. Developmental milestones serve as the basis of most standardized assessment and screening tools.²

Infant milestones: Babies grow at an amazingly fast rate during their first year of life. Developmental milestones are easily identifiable skills that the baby can perform, such as rolling

over, sitting up, and walking. These milestones are usually classified into three categories- motor development, language development and social /emotional development.³

The human inner ear develops during week four of embryonic development from auditory placode, a thickening of ectoderm that gives rise to the bipolar neurons of cochlear and vestibular ganglions. It may take up to 6 months for the baby to fully hear and understand a range of sounds. From birth, baby will pay close attention to sounds especially high pitched ones. Baby will also respond to familiar voice like lullaby from 6 to 7 months baby will realize where the sound come from and turn quickly towards new one. By 12 months baby will be able to recognize her favorite songs may even try to join in⁴⁻⁵

Music is an art, entertainment, pleasure, and medicine for the soul and body. Music is one of the few activities that involve using of the whole brain. It is intrinsic to all cultures and has surprising benefits not only for learning language, improving memory and focusing attention, but also for physical coordination and development. Music is a complex amalgam of melody, harmony, rhythm, timbre and silence in a particular (intended) structure. Music is a sonoric event between noises and silence (Attila), a total social fact (Molino) something in which truth has set itself to work⁶. Not all types of music have favorable effects. Music can be distracting if it's too loud or too jarring or if it competes for our attention with what we're trying to do. But for the most part, exposure to classic music has beneficial effects such as pain relief, reduction of blood pressure etc. Music can help to reduce both the sensation and distress of both chronic pain and postoperative pain.⁷

Listening to music can reduce chronic pain from a range of painful conditions, including osteoarthritis, disc problems and rheumatoid arthritis.⁶

There are several theories about how music positively affects perceived pain. Such as:

1. Music produces repulsive effect.

2. Music may give the patient a sense of control

3. Music causes the body to release endorphins to counteract pain

4. Slow music relaxes by slowing breathing and heartbeat.^{8,9}

More recently, the use of structured stimuli (e.g., music therapy) has been encouraged as a means of reducing environmental stress. Other stress reduction techniques that have been employed to minimize environmental stress include clustering of nursery activities, positioning or swaddling of preterm infants, touch/massage therapy, kangaroo care, oral sucrose, non-nutritive sucking, and music therapy. The music therapy intervention includes live singing of the songs, such as familial lullaby or twinkle-twinkle. In the cases where parents did not identify a favorite lullaby; entertained breathing sounds through live application of ocean disc and entrained live heartbeat sounds, through the use of Gatos box is used. Interventions will be provided live and delivered through the portholes of incubators, isolates, or at bassinette side of the infants midline to encourage fetal positioning.

Procedure:

Parents were briefed about the study, the intervention and an informed written consent was obtained from the parents and concerned institute. After taking an informed consent, the participants were screened according to the requirement of the study. Thirty full term infants with immediate cry after birth and having APGAR score more than 7 were included in the study. Out of thirty infants, there were 10 female and 20 male infants. They were randomly selected and divided into two groups, Group A and Group B. Fifteen participants were included randomly in each group. Group A was given high pitched music and Group B was given low pitched music for 20 min. Music was delivered through portholes of the bassinette. The distance 44 cm distance was kept between the baby and speakers. The music used was instrumental music of 45dB. The high pitched music was

between 35 to 45 dB and low pitched was between 25 to 35 dB.⁸ It was given under the supervision of researcher. The music used was 1. Lullaby - The song from church or synagogue. 2. Ocean Disc- it is an instrument that is round and is filled with tiny metal balls. 3. Gatos box - it is a small rectangular tuned musical instrument that is used to provide an entertained rhythm in soft timbre, meant to stimulate a heartbeat sound that the neonate hear in the womb.⁹

The immediate recording of pre and post vital signs viz. Heart Rate, Respiratory Rate and O₂ saturation levels were recorded.

Data Analysis:

The Pre and Post data was recorded for Heart rate, Respiratory Rate and O₂ saturation levels. By using Paired t test the data was analyzed.

Table 1: Comparison of Vital Signs in Pre and Post test values of Low and High Pitched Music

			MEAN+_SD	t value	p value	
Low Pitched Music	Heart Rate	Pre test	100.80+_7.96	5.2915	0.0001	Significant
		Post test	96.13+_6.06			
	Respiratory Rate	Pre test	40.93+_5.50	12.4353	0.0001	Significant
		Post test	37.33+_5.54			
	O₂ Saturation Levels	Pre test	88.07+_4.68	4.9073	0.0002	Significant
		Post test	95.20+_2.43			
High Pitched Music	Heart Rate	Pre test	100.20+_7.40	2.4525	0.0279	Significant
		Post test	103.60+_8.97			
	Respiratory Rate	Pre test	39.73+_5.12	2.2409	0.0418	Significant
		Post test	41.93+_4.77			
	O₂ Saturation Levels	Pre test	87.60+_4.27	6.4157	0.0001	Significant
		Post test	95.40+_2.69			

Table 2: Comparison of Vital Signs between post test values of Low and High Pitched Music

Post test		MEAN+_SD	t value	p value	
Heart Rate	Low Pitched Music	103.60+_8.97	2.6708	0.0125	Significant
	High Pitched Music	96.13+_6.06			
Respiratory Rate	Low Pitched Music	37.33+_5.26	2.0420	0.0500	Not Significant
	High Pitched Music	41.93+_4.77			
O₂ Saturation Levels	Low Pitched Music	95.20+_2.43	0.2137	0.8324	Not Significant
	High Pitched Music	95.40+_2.69			
	Post test	95.40+_2.69			

Result:

While analyzing individual pre and post test values of individual vital signs, it indicates that there was significant change Heart Rate (HR), Respiratory Rate (RR) and oxygen saturation levels of infants during application of both Low

pitched as well as high pitched music (Table 1). Whereas while comparing post test values Low and High pitched music of all three vital signs, only significant change was observed in Heart Rate (Table 2).

As there was significant increase in heart rate and respiratory rate, noted when high pitched music was given, and decrease in heart rate and respiratory rate with low pitched music therefore, the initial hypothesis, that infant directed music would increase oxygen saturation levels and decrease heart rate and respiratory rate, is rejected. Differences in the oxygen saturation levels pre and post were not statistically significant. Oxygen saturation levels did not vary significantly at any time in any of the infants at any phase of data collection. Oxygen saturation levels remained relatively constant for all infants. Therefore, oxygen saturation levels may not be a valid measurement of the effect music on the physiological responses of infants to music.

Discussion

This study result is consistent with the findings of Cassidy & Standley (1995), in which no significant change in oxygen saturation levels was observed across three trial of recorded music exposure.^{10, 11, 12} The present study demonstrated that low pitched music decreases heart rate and respiratory rate immediate post-intervention within this group and there was significant difference on comparison between two groups (high and low pitched music). The study also compared effectiveness of low pitched music and high pitched music on vital signs. Even though the difference in pre and post test measures when observed within groups, a comparison between groups produce significant differences which shows that music have clinical advantage in improving vital capacity. Result of our study concluded that the low intensity music was better than high intensity music on heart rate.

Sound is the most effective modality to achieve concurrent decrement in motility along with enhancement of cortical activity. Music can stimulate the many areas of the brain including the Hippocampus which governs the area of long-term memory. Music provides multisensory experience for infants to enhance and encode body movement awareness. It enhances the

natural movement and vocalization infants make without words. Infants tend to focus while listening to soothing and sedative music. Children who grow up listening to music develop strong music-related connections in the brain.^{13, 14}

Music as a complex temporal organization of acoustic events, perceived mainly through the auditory modality, possesses inherent qualities that may be used to aid in very specific aspects of motor behavior. Gallahue discusses these temporal qualities regarding motor development in children. Temporal awareness is intricately related to, the coordinated interaction of various muscular systems and sensory modalities. Rhythm is the basic and most important aspect of developing a stable temporal world. Change of difference in pre and post test measures when observed within groups, a comparison between groups produce significant differences which shows that music does have clinical advantage.^{15, 16}

Conclusion

The study concluded that single intervention of low pitched music is effective in improving vital signs especially heart rate and respiratory rate. On comparison between high pitched music and low pitched music there is difference. Low pitched music has immediate effect and better effective for the patient as compared to high pitched music.

Limitations and Recommendations:

- The study could be more effectively done if advanced music instruments used to measure and maintain rhythm and sound of the music
- There is opportunity to assess the effects of music in different conditions in adults as well as pediatrics

References

1. Algranati PS, Dworkin PH. Infancy problem behaviors; Pediatric in Review.1992:1992:13:16-21

2. Blasco P.A. Early developmental indicators of intellectual deficit. *Pediatric rounds*. 1993; 2:1-3
3. Hodges, Ashley L, Wilson, Lynda Law" effects of music therapy on preterm infants in the neonatal intensive care unit" *Alternative Therapies in Health and Medicine* Sep/Oct 2010, Vol 16 No 5, 72-73.
4. Ruben RJ. The ontogeny of human hearing, *Acta Otolaryngol* 1992; 112: 192–196.
5. Querleu D, et al. Hearing by the human fetus? *Perinatol* 1998;13: 409–420.
6. Raweewan Lekskulchai and Joan Cole, Effect of a developmental program on motor performance in infants born preterm, *Australian Journal of Physiotherapy* 2001 Vol.47, 169-176
7. Siedliecki SL, Good M. Effect of music on power, pain, depression and disability. *J Adv Nurs*. 2006 Jun;54(5):553-62
8. Priyanka K. Nakhwa et al, Efficacy of music therapy in improvement of neuromotor development in preterm infants, *Romanian Journal of Physical Therapy* 2017, Dec; 23 (40):5-11
9. Nilsson U, Unosson M, Rawal N. Stress reduction and analgesia in patients exposed to calming music postoperatively: a randomized controlled trial. *Eur J Anaesthesiol* 2005 Feb; 22(2):96-102
10. Ladenberger-Leo E. Effect of music on the general feeling of persons performing monotonous work. *Med Pr*. 1986; 37(6):347-52
11. Music Therapy Research in the NICU: An Updated Meta-Analysis. Jayne J Standley *Neonatal Netw* 31(5):311-6 (2012)
12. The Effect of Music Listening on Physiological Responses of Premature Infants in the NICU *J Music Ther* (1995)32(4):208
13. Cassidy, J.W., & Standby, J. M. (1995). The effect of music listening on Physiological responses of premature infants in the NICU. *Journal of Music Therapy*, 32(4), 208-227
14. Michael H. Thaut. Rhythmic Intervention Techniques in Music Therapy with Gross Motor Dysfunctions. *The Arts in Psychotherapy* 1988; 15: 127-137.
15. Michael H. Thaut, et al. Distinct cortico-cerebellar activations in rhythmic auditory motor synchronization. *Cortex* 2009;45(1): 44-53.
16. Lorch, C. A., Lorch, V. Diefendorf, A. O., & Earl, P. W. (1994). Effect of Simulative and sedative music on systolic blood pressure, heart rate, and respiratory rate in premature infants. *Journal of Music Therapy* 31(2), 105-118