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ALTERNATIVE THERAPIES IN REDUCING ANXIETY AND PAIN FOR INVASIVE PROCEDURES IN PEDIATRIC PRACTICE

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ABSTRACT

The multiple roles that music plays in our life, entertainment, inspiration, development of cognitive skills and improvement of psychomotor and socio-affective abilities extends to therapeutic effects. The physiological effect of music is reducing the level of stress hormones (cortisol and adrenaline) and releasing endorphins with calming and analgesic properties. An invasive medical procedure such as endoscopy, colonoscopy or surgery is a major factor for distress in children. Dental anxiety with a high prevalence in children has numerous negative effects and a proper management is required; non-pharmacological alternative treatments are studied lately. Many studies concluded that music therapy is useful in reducing nervousness and pain, improving blood pressure, cardiovascular parameters and oxygen saturation and in increasing cooperation and tolerance. Music might be successfully used as a non-invasive, non-pharmacological alternative method with multiple benefits and the potential to reduce major effects of invasive medical procedures in children.

Key words: Children, Music therapy, Dental care

INTRODUCTION

Although music therapy was first used mostly in psychotherapy, its therapeutic applications expanded over time. Nowadays, it is broadly agreed that music therapy helps in somatic pain relief, improves the moods of both patients admitted to the hospital and their families, and reduces the feelings of anxiety and tension caused by medical procedures. Due to its effect on the central nervous system, music is an important factor that provides relaxation and stress reduction. As a tool of personal development, music can help to enhance cognitive (attention, memory), psychomotor (agility, coordination, mobility) and socio-affective skills. Peter Sleight, a cardiologist and researcher from the Oxford University, suggests that music with a slow tempo can regulate the respiratory rate and reduce blood pressure. (1)

As far as the type of therapeutic music is concerned, although psychological studies carried out in various research laboratories proved that it can differ from one individual to another and that it depends on the individual's education, the results still allowed for the development of several recommendations regarding the types of music with psychological relaxation effects: Beethoven's Concerto no. 5 for Piano and Orchestra and Wagner's Parsifal Overture, Debussy's Sonata for Flute, Viola and harp and Claire de Lune, Chopin's Nocturnes, Vanghelis' L'Apocalypse des animaux. (1) The recommended techniques vary based on the age group, severity of the illness or the duration and importance of the medical procedure, as well as the premedication and anesthesia. For children, it is recommended to use creative expression of emotions and the opportunity for choosing a particular melody

or instrument – xylophone, harmonicas and even drums – increasing the chances of coping with the hospital environment. For teenagers, certain familiar melodies create a feeling of security, while learning a new song actively modulates the feelings and emotions, increasing their capacity of coping with panic and pain. Familiar songs or lullabies are recommended for younger children, either sung by a family member or played by a CD; depending on the child's age, it is further possible to use headphones or allow them to play on a tiny piano, string instruments, etc. The repertoire must also be carefully selected based on the same criteria, starting with the abovementioned lullabies, classical music for children – The Toy Symphony and other tonic compositions by Mozart, Vivaldi's Seasons, Johann Strauss' Blue Danube, George Enescu's Ciocârlia, etc., all of these having simple rhythms, as well as adequate harmonies, timbres and amplitudes. (2)

Starting from these aspects, we set out to study the emotional impact of medical procedures in children and teenagers, as well as the possibility to improve the patients' psychological comfort using music therapy associated with psychological preparation. Going through the specialty literature, we identified several studies that focus on similar aspects. The beneficial effects of music therapy were highlighted in numerous meta-analyses but it is difficult to quantify the extent to which these effects can be directly attributed to music therapy. (3) Music stimulation generates an activation of the right hemisphere, which is in charge of perceiving sounds and rhythms. The right hemisphere is responsible for the three-dimensional visual perception and the perception of music and colours and does not perceive time. Therefore, the use of music causes a good mood, reduces the distress and induces the sensations that the time is shorter. The psychological time will be shorter than the physical time.

A pleasant environment makes the patient feel that the procedure takes less time than it actually does. (4)

Due to its physiological effect, a relaxing music can relieve children's discomfort, lowering the level of cortisol and releasing endorphins that have calming, analgesic and euphoric properties. There are studies proving that the level of "stress hormones" – adrenaline and cortisol – can be diminished by 19% with the help of relaxing music. (5)

Music therapy and invasive medical procedures

Endoscopic explorations are known to be invasive, sometimes painful and thus nervousness generating procedures that have a particular emotional impact. In order to diminish the patients' discomfort during colonoscopic explorations, in most of the Western countries the standard procedure is to perform such explorations under conscious sedation alongside retrograde amnesia carried out using midazolam or sedo-analgesia. (6) These methods are also used in the case of paediatric patients both for colonoscopy and upper digestive endoscopy procedures. Aside from the rare adverse effects caused by the administration of pharmacological substances, another disadvantage of sedo-analgesia is its increased costs and the time it consumes. For this reason there are numerous studies focused on identifying alternative methods for easing the patients' discomfort, including music therapy. (7)

Recent studies report conflicting results: a study on 109 randomized patients focusing on the role of music therapy in reducing the patient's discomfort during the colonoscopy procedure proved the clearly beneficial role in reducing pain and improving the levels of post-procedural satisfaction. On top of that, medical staff perceived that procedures carried out with music playing in the background were less difficult. (8) Another study carried out on 180 patients proved that music in endoscopy laboratories reduces anxiety irrespective of the type of procedure or the patient's age, as well as that music therapy is a straightforward and effective method for improving the quality of life. (9) Another research with a special design created to evaluate the effect of music on pain during colonoscopy procedures failed to prove any differences between the groups studied. (10) Other authors reach the

conclusion that music played during some medical procedures increases the patients' levels of cooperation and tolerance towards the medical procedure by regulating their blood pressure and oxygen saturation; this can also reduce the duration of such procedures. (11) A meta-analysis of 39 studies including 3.394 children with ages between 2 and 19 that underwent some psychological interventions aimed at reducing their distress and pain related to venipunctures and vaccines revealed the effectiveness of hypnosis and cognitive-behavioural therapy. (12) Other aspects that were studied include the effect of music on reducing anxiety in children with respect to stomatological interventions, as well as in the emergency rooms of paediatric hospitals. (13)
Recent research suggests that music can be used as a complementary method for the purpose of reducing pain and anxiety during the post-anaesthetic and post-operative periods, as well as in the neonatal intensive care units. (14) It seems that in the case of children that undergo major surgical procedures, ambient music played during the waking up period improves cardiovascular parameters and the stress-induced hyperglycemia– such effects are more obvious in older children. (15)
Alternating fast and slow rhythms with pause periods can have positive effects even for younger ages. (16)
Music therapy is widely used, but a definitive place in paediatric surgery guidelines is not yet established. The perioperative discomfort, nervousness and distress can't be completely prevented with medication therefore non-pharmacological methods gained more and more terrain. The music therapists can choose from live music therapy or recorded music, first is used a music matched with the patients physiological and psychological state and then gradually changes the music to modify the patient's status. A systematic review and meta-analysis of the literature was conducted in order to determine the role of music therapy in paediatric surgery and showed that music intervention is a non-invasive, inexpensive and useful complementary tool which improves relaxation in children undergoing surgery. (17) Some authors concluded that music therapy effects on cardiorespiratory system are decreased heart rate and blood pressure, decreased respiratory minute-volume and oxygen consumption; on endocrine system reduces plasma levels of catecholamine, cortisol and decreased basal metabolic rate; on vegetative system reduces nausea and vertigo, increases pain tolerance. In the same time the level of premedication is reduced by 50% together with the post-operative analgesics; the patients have less post-operative confusion, fewer hospitalization days and an increased effectiveness of the medical staff was reported. (18) A study on 60 children that underwent major surgical procedure suggests that audio therapy should be considered an important method to decrease post-operative discomfort; music stimulation promotes a multimodal therapy so further guidelines and standardized applications for this promising method of pain management need to be formulated. (19)
Children from oncology units react to diagnosis, treatment, invasive procedures and hospital environment with discomfort, suffering, stress and low level of motivation. A study on 83 oncologic patients concluded that music therapy is a useful method in symptoms management with positive effects, both psychological and physiological. (20) Music therapy before, during and after a lumbar puncture procedure reduces suffering and discomfort and stabilize heart rate and respiratory rate. (21) Imagery and relaxation music may help cancer patients to perceive less discomfort and nausea during treatment. Another positive effect is improving motivation, reducing feelings of isolation, improving quality of life and increasing patient's participation in treatment. (22)
In neonatal intensive care unit, studies proved that music therapy improve vital signs, feeding behaviour and suckling pattern, reduced the parental stress. Some authors recommend that music should be a part from premature infants' standard protocol as a base for multi-layered and multimodal stimulation. (23)

music therapy in dental practice

Dental anxiety is defined as an abnormal fear for dental procedures. The prevalence in children is between 6 and 20%. (24) Patients with dental anxiety due to avoidance behaviours tend to neglect dental care, which lead to deterioration of oral and dental health. This condition, if poorly managed lead to a cycle of dental fear, patients delaying the moment of referral to the physician because of their fear and the dental diseases are worsening, requiring intensive and potentially traumatic treatment, which reinforces the fear and leads to continued avoidance behaviour. An alternative from pharmacological treatment of dental anxiety may be music therapy which has the ability to reduce nervousness and pain, facilitate relaxation and improve the relationship dentist-patient and also the time of recovery after the procedure (so, a shorter time, lower distress and lower costs). Music therapy is a valuable alternative in terms of reducing the physical and psychological distress of children who visit the dentist. (25) On the other hand, a study conducted on 45 paediatric patients concluded that music therapy doesn't improve the above parameters in dental procedures, but a positive effect on relation between doctor-patient is obvious. (26) Children with autism, due to their limited capacities of social interactions, their difficulties in relating to other people and their fear of dental procedures have a higher prevalence of dental caries, poor oral health and more periodontal diseases. A study showed that systematic desensitizing associated with music therapy may improve cooperation during dental examination and treatment. (27) Other authors concluded that the use of art in the adaptation and environmental inclusion of the patient, prior to dental procedures is favourable and efficient. (28) It is widely accepted that one of the most feared and stressing procedure in dental treatment is the injection of local anaesthetic. In local analgesia administration, music therapy reduces anxiety and increase post procedural satisfaction.

In dental surgery, one of the main objective of the paediatric dentists is to provide a positive experience to the children and various behaviour guidance techniques are available. One useful method is distraction, shifting child attention from dental procedures. Distracters can be in active or passive form, although some studies suggest that passive distracters are more effective and less demanding from children. The most used passive distraction in dentistry are audio and audio-visual form, however audio (music) remains the widely preferred choice. (29) However, other researchers concluded that audio distraction did decrease the anxiety level in paediatric dental patients, but not to a very significant level. (30) Promising new results encourage application of music therapy techniques in different dental specialties. (31)

Conclusions

Even if it is still an intensively debated problem, music therapy should be taken into consideration in paediatric practice, especially in hospital environments or dental offices.

Music therapy might be a non-invasive, non-pharmacological, inexpensive and useful complementary tool with multiple benefits and the potential to reduce anxiety, pain, time of recovery and distress in children and improves doctor-patients relationship and quality of life.

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