



## Application of Music Therapy in Dentistry

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### ABSTRACT

Music therapy is being integrated in the medical and dental fields nowadays, as well as treatment of drug addiction, alcohol and tobacco use. Music therapy also has proved its acceptance to manage anxiety and depression. The purpose of this review article is to explore the applications of music therapy in dental treatment procedures

### I. INTRODUCTION

Stress and anxiety is a significant issue in the dental care of adults and children. This leads to avoidance of dental care which may result in significant deterioration of oral and dental health. Patients who visit the dentists for especially for the first time will be more apprehensive and may suffer severe stress and anxiety. This could be due to conditioning or learned responses which these patients might have experienced. The dental surgeon should be able to anticipate this before the patient management. Thus patients predisposition to dental stress and anxiety may be identified and assessed which will enable to take appropriate precautions preoperatively to provide stress free dental treatment and better postoperative recovery<sup>1</sup>.

There are various treatment options and various possible avenues to explore for managing dental anxiety. These include pretreatment anxiety questionnaires, cognitive behavioural therapy, relaxation therapy, computer assisted relaxation learning, yoga, hypnotherapy, group therapy, individual systematic desensitisation, pharmacological, flooding (implosion), and swallowing relaxation. These forms of treatment are essentially a form of counter conditioning to reverse the fear into a state of acceptance and calm.<sup>2</sup>

Music therapy has been used in different fields of medicine to meet physiological, psychological and spiritual needs of patients and has shown to be effective and a valid treatment option for medical patients with variety of diagnoses. It is the professional use of music and its elements as an intervention in a medical, educational and

everyday environment with individuals, who seek to optimise their quality of life and improve their physical, cognitive, emotional, social, communicative intellectual and spiritual needs.

It has a wide range of applications. Music therapy can be used to address patients needs related to respiratory, chronic pain, physical rehabilitation, diabetes, headaches, migraines, cardiac problems, surgery and obstetrics, and terminal illness. Research results and clinical experiences show that music therapy has shown its effectiveness even in those patients resistant to other treatment approaches. Music is a form of sensory stimulation, which provokes responses due to familiarity, predictability, and feelings of security associated with it. Music interventions can be either passive music listening or active music therapy. Music has been linked with the physical and emotional healing.

The ancient Greeks assigned the god Apollo to reign over both music and healing.<sup>3</sup> Ancient Shamanic curative rituals used rhythmically repetitive music to facilitate trance induction.<sup>4</sup> Aristotle and Plato both prescribed music and dancing for the fearful and anxious, while Aristotle spoke of the power of music to restore health and normalcy.<sup>5</sup>

Music have been proven to have effects on medical conditions like autism, Parkinson's disease, Schizophrenia, Depression, Dementia and other neurological disorders<sup>6</sup>.

### MUSIC THERAPY AND HUMAN BODY MUSIC AND HUMAN BRAIN

Our inner ear is specialised cells in the form of spiral sheets and this in associates the music we hear with feelings, emotions and past experiences. In a nutshell, vibrations in the air produced by music or sound causes disturbance in thousand of tiny hair spread across a spiral sheet in the inner ear. The nerve cells which get excited due to which the brain senses music or sound. Researchers are conducting extensive studies on how different kinds of brain damage interfere with normal perception of music and hearing.

**Auditory cortex:** Music is activated in the auditory cortex and is connected to “hearing”. We “hear” music here but do not “enjoy” the music. Analysis and understanding the music is done in the association area.

**Limbic system & diencephalon:** This area of brain is connected to our previous experiences in life and responsible for “gut” reactions to music. It improves mood and reduces stress. People tend to “enjoy” music here. Music can bring out varieties of emotional response among the subjects.

**Motor cortex:** Motor cortex can be activated using various methods. Playing with fingers, with mouth, singing, clapping and moving feet, dancing, activates the motor cortex.

**Sensory cortex:** Music gets processed in sensory cortex when there is a sensory feedback from the instrument we play or when we listen to music especially when we hear the music with closed eyes.

**Visual cortex:** The role of music in activating visual cortex is while reading notations, co-ordinating with other players and visual feedback.

**Cerebellum:** The cerebellum gets involved when there is a fine work of fingers – force, pressure & coordination, maintenance of body posture, while dancing.

#### **Clinical implications :**

Most of the lifestyle diseases have been linked to stress. Music therapy can be applied on all such disorders. The various clinical implications of music include Stress-related disorders, Psychosomatic disorders, Behavioral disorders, Emotional aspects of Psychophysical Disorders, Hypertension, Coronary Heart Disease, Hypercholesterolemia, Diabetes Mellitus, Obesity, Stroke, Gastric Ulcers, Intestinal Ulcers, Irritable Bowel Syndrome, Migraine Headaches, Tension Headaches, skin allergies, Acne, Psoriasis, Asthma, Rheumatoid Arthritis, Backache, TMJ Syndrome, Autoimmune disease, Reproductive diseases, Insomnia

#### **Therapeutic Effects of Music:**

Music reduces blood pressure & heart rate, improves breathing, Improves immunity & reduces infections. Music relaxes muscles, relieves tension & reduces pain. It Improves body movements & co-ordination. Music also strengthens memory & learning. Music reduces the levels of certain hormones like ACTH, Cortisol and increases the level of immunoglobulins like IgA, NK cells & NO. Music induces sleep and improves quality of sleep.

#### **Psychological effects of music**

Provides distraction from unfamiliar surroundings, brings memories from the known world, reduces anxiety and modifies stress-response, changes perception of space & time, enhances unconscious reception and response, enhances self-esteem, provides a feeling of safety & well-being, helps to open and release emotions.

#### **APPLICATIONS OF MUSIC THERAPY VARIOUS FIELDS**

**MUSIC AND MEDICINE:** Music has been put to use in various hospitals, nursing home, clinics, wards and many other places where anxiety and stress levels are high. Medical students tend to show high affinity to music than other university graduates as they are well known for experiencing very high stress levels which must have got them to engaging in to more stress-relieving activities and sharing such activities and experiences with their patients.

The modern use of music therapy in hospitals developed during the 1950s in Europe and United States. Many physicians started utilizing music therapy in patients who were thought to have interest in music, recognizing the soothing effect of music.<sup>4</sup>

Patients who listened to music while waiting for surgery subjectively reported lower anxiety and also displayed lower blood pressure and pulse rates than those who did not. Postoperative patients also have pointed out the comforting aspect of music.<sup>7</sup>

#### **MUSIC AND AUTISTIC SPECTRUM DISORDER**

The Autism Society of America defines Autism as a certain set of behaviours that effect a person's ability to connect and communicate with others, and as a spectrum disorder, it affects people to different degrees. Music has been used to help improve educational, cognitive and emotional skill sets in children of all populations, and has been shown to improve focus, listening and abstract thinking skills and better socio-emotional connections.

Studies show that music is a mode of intervention and has proved its beneficial effects for the modification of behavioural problems.<sup>8</sup>

#### **MUSIC THERAPY IN CARDIAC PATIENTS**

Music therapy has been applied in patients with history of myocardial infarction, coronary artery bypass graft, and other cardiac issues. Music therapists intergrate their technique

into cardiac care units, often treating patients who require assistance in coping with stress.

Masoumeh Forooghi et al have studied the effect of music intervention on anxiety and hemodynamic parameters during coronary angioplasty and reported that it is a safe, simple inexpensive and non invasive nursing intervention, which can significantly alleviate patients anxiety during coronary angioplasty.<sup>9</sup>

Ulrica Nilsson et al reported that listening to music during bed rest after cardiac surgery have some effects on the relaxation as regards to oxytocin and subjective relaxation levels. The effect seems to have causal relation from psychological to physical. It is a supportive source that help in relaxation.<sup>10</sup>

Susanne M Cutshall et al found that recorded music and nature sound can be integrated into the postoperative care of cardiovascular surgery patients. The recordings may provide an additional means of relaxation for these patients.<sup>11</sup>

#### MUSIC THERAPY IN PATIENTS UNDERGOING STRESS AND DEPRESSION

Stress is a state of psychological and physical tension produced when an individual perceives that they are unable to cope with the demands imposed on the of the body.

As a result of stress, the hypothalamus secretes corticotropin releasing hormone, which leads to the release of adrenocorticotropic hormone. The adrenocorticotropic hormone causes the sympathetic ganglia to stimulate the adrenal medulla to release a mixture of epinephrine and norepinephrine that triggers physiological fight or flight hormones, that leads to increase in heart rate, bloodpressure and breathing.

Stress and depression are associated with feelings of displeasure, staying away from friends or family, lack of motivation and defeat intolerance, decreased libido, decrease or increase in appetite and weight, decreased energy and cause fatigue, sleep disturbances. Medication and behavioral therapies can be used to reduce the level of patients' anxiety and depression.

Stress can have various effects on patient's body and minds such as addiction, drug dependency, blood pressure, weakening of vital signs, drowsiness, nausea, vomiting, and even shock. In addition, the routine therapeutic methods are time-consuming for nurses and impose heavy cost to the health-care systems.<sup>12</sup>

The soothing power of music has a unique link to our emotions, so can be an extremely effective stress management tool. Music provides

distraction from unfamiliar surroundings ,brings memories from the known world, reduces anxiety and modifies stress-response ,changes perception of space & time ,enhances unconscious receptivity to symbolism enhances self-esteem ,generates a sense of safety & well-being ,helps to open and release emotions

As music can absorb our attention, it acts as a distraction at the same time it helps to explore emotions. This means it can be a great aid to meditation, helping to prevent the mind wandering.

The type of musical preference varies widely between individuals, so decision should be based what you like and what is suitable for a specific mood.

When people are stressed, generally there is a tendency to avoid actively listening to music. Perhaps may feel that it is a waste of time, and doesn't help achieve anything. But as we know, productivity increases when stress is reduced, so this is another area where you can vast rewards can be achieved.

#### MUSIC THERAPY IN CANCER PATIENTS:

Diagnosis of cancer is one of the most feared and serious life events that cause stress in individuals and families. Cancer disrupts social, physical and emotional well-being and results in wide range of emotions, including anger, fear, sadness, guilt, embarrassment and shame. Music therapy is a part of a complementary medicine program in supportive cancer care and palliative in addition medical treatment. The benefits of music therapy for cancer patients include interactive music therapy (instrumental improvisation, singing) as well as receptive music therapy (listening to recorded or live music, music and imaginary) can help to improve mood, decrease stress, pain, anxiety level and enhance relaxation. While some types of cancer are best addressed with a single type of treatment, others are treated through a combination of surgery, chemotherapy and/or radiation therapy. The music therapy program is applied to meet patients' needs during diagnosis and treatment and is practiced with both individual patients and patient groups.

Music therapy is basically divided into two types—active (interactive) and receptive (passive). In the active form of patients are musically engaged and encouraged to create or describe their experiences with music. Receptive forms of music therapy involve the patient simply listening to either live or recorded music. The patients have a chance to experience several music therapy interventions. Techniques are selected from a

variety of options based on patients' needs, expressed preferences and music therapist's assessment. They include listening to the live or recorded music, instrumental improvisation, relaxation techniques with music, movement with music.<sup>13</sup>

#### USE OF MUSIC THERAPY IN DENTAL TREATMENT

Dental treatment procedures are often associated with anxiety which is often caused by unpleasant sounds in dental office, but music can mask such sounds and have direct influence on reducing pain. Music uses auditory distractions and activation of large number of neurotransmitters to divert attention and eliminate feelings of pain and fear. Listening to familiar and preferred music will definitely helps patients to regain sense of control.<sup>14</sup>

It is believed that pain control may block paths to brain receptors by music and as a result reduce perception of pain and necessary doses of analgesics.<sup>15</sup>

Such application of music is often called white noise effect, and it implies playing the music before the procedure starts.

#### MUSIC IN PEDIATRIC DENTISTRY

The etiology of dental anxiety in kids may be attributed to traumatic and painful dental experiences as well as fearful attitudes learned from a dentally anxious family member.<sup>16</sup>

Children can be anxious when visiting the dentist, especially in the dental waiting area. Management of pediatric patients having dental fear are of concern during dental procedures and are very challenging.<sup>17</sup>

Dental visits can lead to significant fear among five to six percent of the whole population. Moreover this proportion can be upto 16% in children.<sup>18</sup>

Music distraction is considered to be an efficient, relaxation method. It is considered safe and inexpensive, which can help during short and painful dental procedures in kids.<sup>19</sup>

Music distraction is used to avoid aversive stimuli by helping the child focus on the music, which in turn reduces the anxiety levels in children.<sup>20</sup>

Kim et al (2011) found that music significantly decreased intraoperative anxiety in a group of subjects undergoing extraction, compared with the control group without music therapy.<sup>21</sup>

#### MUSIC BEFORE ENDODONTIC PROCEDURES

Endodontic procedures requires high degree of precision and are considered as one of the most stress inducing dental procedures both to doctor and patient.

Di Nasso L et al tested influence of music as adjunct, in terms of significant changes for systolic blood pressure, diastolic blood pressure and heart rate before, during and after endodontic treatment in a population with different levels of anxiety levels assessed with Corah Dental anxiety scale. It was found that all the measured vital signs improved in the group of patients listening to music.<sup>22</sup>

#### MUSIC BEFORE TOOTH EXTRACTIONS

Karou et al assessed the effect of listening to music during extraction of impacted third molars and suggested that it reduced the anxiety by suppressing the sympathetic nervous system.<sup>23</sup>

Cynthia et al assessed the effect of music therapy on anxiety levels and correlated it to physiologic parameters like salivary cortisol, stimulated salivary flow, blood pressure, heart rate, oxygen saturation and body temperature. They registered significant decrease in the salivary cortisol levels, systolic and diastolic blood pressure, heart rate, body temperature and oxygen saturation in the music therapy treated group.<sup>24</sup>

#### MUSIC BEFORE SCALING AND PERIODONTAL PROCEDURES

Buranavichetkul et al studied the effect of music listening on blood pressure, heart rate and anxiety level for thirty patients undergoing periodontal surgery and found that the heart rate and anxiety level were decreased after music in intervention.<sup>25</sup>

In a study by Stablotz et al, patients were requested to answer the Dental Anxiety Scale (DAS) questionnaire while waiting for treatment. Results showed that tooth extraction, periodontal surgery and scaling caused significant anxiety, while 12.1% of patients referred periodontal treatment reported severe anxiety.<sup>26</sup>

## II. CONCLUSION

Music has proved to induce anxiolytic anti stress effects during the past twenty years in different medical therapies. Music therapy may help in reducing salivary cortisol, blood pressure, heart rate and body temperature among patients. Clinically music can support the patients emotional, spiritual and psychological needs by

creating an environment that stimulates and maintains relaxation, wellbeing and comfort.

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