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Mini-Review – Medicine

Music and Health

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Abstract

Music therapy is the use of intervention to accomplish individual goals within a therapeutic relationship by a professional who has completed and approved music therapy programme. Music has several physiological effects including positive effects on mood, a reduction of anxiety, stress and a lowering of blood pressure. There are several types of music therapy. Music therapy procedures are structured as either receptive or active. Music therapy methods include music recreation, improvisation, composition, listening and receptive experience. In modern health care, music has several applications in the perioperative setting, neurology, family medicine, paediatrics, obstetrics, interventional procedures, the critical care unit, pain management, palliative care and cancer. Though it has some limitations, there is ample scientific evidence to support the beneficial use of music therapy as a low-cost therapy with no side effect in various clinical situations in current health care settings. This article describes the various applications of music in modern health care.

Key words: Anxiety, Blood pressure, Depression, Music therapy

Introduction

Music is intentional sound described in terms of pleasing harmonies, dynamics, rhythm, tempo and volume (Kimberley, 2013). Music is a fundamental aspect of human experience and a common element in the modern human environment. It has several characteristic psychological and physiological effects, many of which have been used to promote and maintain health since many years. Music therapy as a profession was developed from the late 1950s onwards by highly qualified individual music therapists. The American music therapy association defines music therapy as the clinical and evidence-based use of music interventions to accomplish individualised goals within a therapeutic relationship by a credentialed professional who has completed and approved music therapy programme (Rafieyan and Ries, 2007). In some countries music therapists are partly recognised as their contribution is

recommended or acknowledged in specific clinical areas e.g. in Norway music therapy is partly recognised for psychosis, in Poland for psychiatry, in Sweden for schizophrenia and palliative care and in The Netherlands for dementia and neurological rehabilitation. In some countries music therapy is not acknowledged as a health care profession. E.g. Denmark. In all European countries music therapists are working in clinical or social/educational settings. Music therapy is increasingly being recognised in the United Kingdom (Monika, 2016). In European countries, becoming a music therapist involves obtaining a bachelor's degree or obtaining certification through the Certification Board for Music Therapists. In India, it is an emerging field and diploma and certificate courses in music therapy are available at institutes like The Indian Institute of Medical Music Therapy at Chennai, The Music Therapy Academy in New Delhi etc. Recently there has been a rise in clinical research regarding the application of music in various aspects of health care. Keeping this in mind, a literature search was done using the words 'music, music therapy, health care and effects of

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music' using google search engine. The information so collected is presented in this article.

Physiological Effects of Music

Music powerfully stimulates the socio- emotional process. This positively affects the mood and results in beneficial health consequences (Bernatzky *et al.*, 2011). Music therapy employs specific musical elements such as sound, rhythm, melody, harmony, dynamic and tempo to encourage or facilitate movement/positive interaction and/or improved emotional or cognitive effects (Bernatzky *et al.*, 2011). Cognitive activities such as listening to music can affect the perceived intensity and unpleasantness of pain and thereby helps the patient's sense of pain to be reduced (Melzack and Casey, 1968).

Music through its emotional power can influence diverse brain chemistries and network activities. Music stimulation can counteract negative cognitions such as feelings of helplessness and hopelessness and the undesired stress that many patients experience in clinic or hospitals (Bernatzky *et al.*, 2011). Some authors say that music acts as a distractor by focusing the patient's attention away from negative stimuli to something pleasant and encouraging and thus reduces anxiety and stress (Nilsson *et al.*, 2003). This stress reduction can lead to a lowering of the blood pressure (Watkins, 1997). Some authors have found that minor tones of music increased pulse rate and lowered blood pressure, whereas "stirring" music increased both blood pressure and heart rate (Hyde and Scalapino, 1918). Many studies in male and female adults have shown that the blood pressure lowering effect of music is more on systolic blood pressure than on diastolic blood pressure (Sumathy *et al.*, 2015). Some studies have shown that particular types of music (e.g. Mozart's classical music) are more effective for reducing blood pressure (Crippa *et al.*, 2012). Reduction in anxiety levels by music can improve infant bonding in mothers after caesarean section.

Types and Technique of Music Therapy

Music therapy requires a compact disc (CD) or cassette player and a head phone, either reusable or disposable and a music therapist. The music used can be live or recorded (Zanini *et al.*, 2009).

Broadly music therapy procedures are structured as either receptive or active. Receptive music therapy is selective to arouse specific emotions

which in turn allow the patient to more easily access, recall and interrogate memories with the goal of understanding the role those memories play in the patients' current circumstances. Active music therapy requires the patients in conjugation with the trained music therapist to create music. The patient and the therapist sing and play the musical instrument together and the therapist encourages the patient to improve and at times to dance. Active music therapy urges the patient to create an experience (Bernatzky *et al.*, 2011).

Music therapy methods can also include music recreation / improvisation / composition / listening / receptive experience. Recreation is a broader term that includes performing, reproducing, processing and interpreting the whole or any part of a musical existing model with or without an audience. In improvisation, the subject sings or plays music, creating a melody, a rhythm, a song or a piece of musical improvisation. In the experience of composition, the therapist helps the client to write songs, lyrics or instrumental parts or to create any type of musical products such as music videos or audio tapes. In the receptive experiments the patient listens to the music and responds to the experience quietly, verbally or through other modalities.

Music therapy can be administered in the form of group meetings or one-to-one sessions (Henderson, 1983). The Nordoff Robbins approach, based on the belief that everyone is capable of finding meaning in and benefitting from musical experience is now practised internationally. Clinical improvisation is the basis of the Nordoff –Robbins approach to music therapy and rests on the assumption that in every child, regardless of ability or disability, lives an inborn musicality and musical sensitivity (Forinash 1992). The Orff approach to music therapy is also practised worldwide. The musical instruments of Orff include the xylophone, metallophone, bells, triangle, tambourine, timpani, castanets, maracas and woodblock (Hilliard, 2007 and Ghasemtabar, 2015).

Biomusic is music generated in real time from physiological signals. It is an interface which maps physiological signals to music i.e. electrodermal activity to melody; skin temperature to musical key; heart rate to drum beat; respiration to a "whooshing" (Cheung, 2016). Biomusic is used successfully in open groups, which people join

without having had their symptoms declared, and in therapy, such as therapy for recovering drug addicts.

Applications of Music in Modern Health Care

Perioperative Setting

A systematic review and meta-analysis suggested that music played in the perioperative setting can reduce post-operative pain, anxiety and analgesia needs and can improve patient satisfaction (Hole *et al.*, 2015). Some researchers have found that in the waiting room area of an operation theatre, both head phone and broadcast music was effective in reducing the preoperative anxiety (Hyde *et al.*, 1998). Music therapy pre-operatively reduces post-operative pain and analgesic requirements. Intervention with music pre-operatively can modulate the patients' response to stress, and can reduce sedative requirements. Binaural beat audio has been found to have the potential to decrease acute pre-operative anxiety significantly (Padmanabhan, 2005). In a study on 100 patients undergoing elective caesarean section, it was found that music therapy given before surgery decreases post-operative pain and analgesic requirement (Sen *et al.*, 2009). In a systematic review by Nilsson, 5 studies demonstrated a significant reduction in anxiety scores by pre-operative music therapy (Nilsson *et al.*, 2003). A study showed that intraoperative music therapy makes the patient in a positive frame of mind and decreases the requirement of antiemetic and analgesics in the post-operative period (Jayaraman *et al.*, 2006). Music therapy can reduce mean arterial pressure, anxiety and pain among women undergoing mastectomy for breast cancer (Binns-Turner *et al.*, 2011). A study found that music during planned caesarean section under regional anaesthesia improved pulse rate and birth satisfaction scores (Laopaiboon *et al.*, 2009). Music has been used as an alternate or complementary method for blood pressure stabilisation in patients undergoing cataract surgery (Merakou *et al.*, 2015). The ability of music to reduce patient anxiety and pain, both during spinal and general anaesthesia and as well as during conscious sedation has been documented (Mattei *et al.*, 2013). Post-operative music has been shown to reduce fatigue and can also distract

the patient from noise in the post anesthesia care unit (Reza *et al.*, 2007).

Family Medicine

A randomised clinical trial found that elderly subjects exposed to music therapy for 1 month had a statistically significant reduction in depression scores, blood pressure, heart rate and respiratory rate (Chan *et al.*, 2009). A study showed that music is important to adolescents, and this is because it allows them to satisfy their emotional needs (North, 2000).

Neurology

A study in patients suffering from Alzheimer's dementia found significant reductions in anxiety and agitation in patients who received music therapy (Zare *et al.*, 2010). Music therapy can help to improve and restore many functions e.g. motor capacities in patients with Parkinson's disease (Bernatzky *et al.*, 2011). Melody intonation therapy is a common method of treating aphasia (Stahl *et al.*, 2011). Music therapy in stroke patients increases rate of recovery of emotional and social deficits. It improves their quality of life and social functionality by promoting the emotions and can improve motor rehabilitation (Jeong, 2007).

A Cochrane review provided evidence that music therapy may help children with autism spectrum disorder to improve their skills including social interaction, verbal non-verbal communication and social emotional reciprocity, social adaptation skills and improvement in quality of parent-child relationship (Geretsegger *et al.*, 2014).

Music therapy in child rehabilitation helps in sensory and motor development (Barksdale, 2004). Singing is a form of rehabilitation for neurological impairment. Singing training rehabilitation can improve lung function, clarity of speech and co-ordination of speech muscles (Pauland David, 2012). Several studies have demonstrated a positive impact of music therapy by a reduction in anxiety and depression and thereby improved rehabilitation of patients with traumatic brain injury (Guetin *et al.*, 2009).

Paediatrics and Neonates

The Orff approach to music therapy is used in children with autism to improve their social skills (Ghasemtabar, 2015). Orff-based music therapy

sessions improve behaviours and grief symptoms in bereaved school-aged children (Hilliard, 2007).

In a study, it was found that music therapy can improve feeding in hospitalized premature infants and thus promote growth in them (Standley, 2012). Several neonatal nurses believe that music can increase the feeling of security, improve sleep, decrease stress, and reduce pain in premature infants (Polkki, 2012).

Obstetrics

Prenatal Music Therapy for the Foetus

Music exposure in the mother can influence foetal neurogenesis and cerebral plasticity through steroid mediated mechanisms. A study found that pre-natal music exposure significantly and favourably influences neonatal behaviour (Arya *et al.*, 2012). Prenatal music can be said to be the foetuses' beginning of language learning (Schelz *et al.*, 2011).

Prenatal music therapy for the mother

Playing some music that she likes during pregnancy can enhance the mother's communication with the baby and strengthen the bonding. The inner ear of the foetus is fully developed by mid-pregnancy and it is able to hear sounds outside the uterus. Pieces of music that are regularly used to play during pregnancy can soothe the babies after birth. The mother's voice and any familiar pieces of music can help overcome the crisis of separation from the uterus and adapt to the new environment (Sansone, 2004). In a study on 60 hospitalised pre-hypertensive pregnant patients in the third trimester of pregnancy, it was found that listening to relaxing music can reduce the blood pressure and heart rate (Sumathy *et al.*, 2015).

During interventional procedures

Anxiety levels in patients attending for endoscopy were significantly reduced by listening to music (El-Hassan *et al.*, 2009).

A systematic review that analysed 23 clinical studies demonstrated an overall improvement in patient anxiety, mood, heart rate, blood pressure and pain in patient groups subjected to music therapy (Bradt and Dileo, 2009).

A Cochrane review showed that listening to music may improve heart rate, respiratory rate and blood pressure in patients with coronary heart disease.

Music listened to during coronary angiography can reduce intra-operative patient anxiety levels (Bradt *et al.*, 2013).

A systematic review in children demonstrated that listening to music during medical procedures significantly reduced children's anxiety (Nilsson, 2008).

Critical Care Unit

A randomised trial of patients requiring mechanical ventilation demonstrated that a 60-minute session of classical music via head phones caused a significant reduction in systemic and diastolic blood pressure, heart rate and respiratory rate (Korhan 2011). A study showed that premature infants receiving music therapy with endotracheal suctioning in the neonatal intensive care unit had a significantly higher SpO₂ level than when not receiving music therapy (Chou, 2013).

Acute and chronic pain management

Music has been recommended in the acute pain management guidelines (Nilsson *et al.*, 2001). In a multimodal pain management programme, music can reduce the need for pharmaceutical interventions. Studies show that music can alleviate feelings of stress/distress and depressive affects in individuals suffering from acute and chronic pain (Bernatzky, 2011).

Palliative care and cancer

Patients experiencing lengthy hospital stay, cancer patients and his/her family can benefit from therapeutic music (Richards *et al.*, 2007). It has been found that children undergoing chemotherapy reported lower scores in pain, heart rate, respiratory rate and anxiety after listening to music (Nguyen *et al.*, 2010).

In sports and exercise

During exercise, music can improve mood state, increase arousal and reduce fatigue. Studies have shown that aerobic testing with music showed improved performance and mental and physical arousal (Chakravarthi, 2014).

For the medical team

Primary studies and some systematic reviews have shown that medical teams might be more relaxed and attentive when listening to music that they enjoy (Hole *et al.*, 2015), nevertheless,

newly employed nurses exposed to 30 minutes of music had lower cortisol levels, heart rate and mean arterial blood pressure (Lai and Li, 2011).

In Psychiatry

Music therapy as an addition to standard care helps people with schizophrenia to improve their global state and may also improve mental state and functioning if a sufficient number of music therapy sessions are provided (Gold *et al.*, 2005). Music therapy significantly diminished schizophrenic patients' negative symptoms, increased their ability to converse with others, reduced their social isolation, and increased their level of interest in external events (Tang, 1994). Some studies have shown that that music has proven to be significantly effective in suppressing and combating the symptoms of psychosis (Silverman, 2003). Studies on music therapy have found numerous benefits for patients with substance use disorders. Activities in music therapy in such patients are associated with a decrease in anxiety, depression, anger and stress (Aletraris *et al.*, 2014).

Limitations / drawbacks of music

A meta-analysis and a Cochrane review did not identify any side effects of music therapy in any of the studies (Hole *et al.*, 2015). However, music therapy does have some drawbacks.

The use of music may be inappropriate in some settings. The medical team might be distracted if music is audible from the patient's headphone. Music might impede communication with patients, especially during an awake procedure. In a peri-operative setting, music may interfere with communication among the medical team.

Re-using of head phones may cause cross contamination and nosocomial infections (Lee *et al.*, 2011).

Some studies have failed to show a significant difference in reduction of pain with music (Broscious, 1999; Good, 1995 and Heiser *et al.*, 1997). Some studies have not demonstrated reduction in anxiety levels with music therapy (Good, 1995; Heiser *et al.*, 1997 and Kwekkeboom, 2003). Some types of music like rock music can elevate the blood pressure (Crippa *et al.*, 2012).

Conclusion

Music is a low-cost therapy with no side effects. There is plenty of scientific evidence to support the beneficial effects of music therapy in various clinical situations in current health care settings. We recommend the routine use of music therapy in peri-operative settings and during interventional procedures. The field of music therapy holds a promising scope for detailed research on different types of music to match specific clinical situations.

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