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Review Article

Musical Intervention in Dentistry

Musical Intervention: An Evolutionary Era in Dentistry

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Abstract: Patients feels anxious when facing an intrusive operation in a dental office. Such perceptions may be triggered by various circumstances, including a bizarre situation, lack of control, a sense of imminent danger, reliance on strangers, and being far from dear ones and friends. One of the most serious problems in both children and adults is dental anxiety. Patients who are anxious avoid going to the dentist and postpone their appointments. Mostly, these patients with dental phobia feel more anxious while sitting in the waiting area. To manage these patients, a decrease in the waiting period is also one of the considerable options. Dental stress must be identified and alleviated for such patients to receive quality care. Dental care is regarded as an invasive procedure and causes dental anxiety. To treat such type of fear, various complementary therapies should be considered. Functional relaxation therapy is also used to distract the patient's mind. Through distraction and the promotion of a calm environment eliminates stress, anxiety, and fear, music has a therapeutic effect. Various studies were reported in the literature that musical therapy has a significant impact on managing dental anxiety. Dental anxiety, which is a long-term mental handicap for patients, can be managed by applying music therapy. The objectives of this review are to know the means that trigger dental anxiety and to know how to manage it with musical intervention. This literature review aims to gain knowledge of musical intervention in an era of dentistry to manage dental phobia. To conclude, the effect of musical therapy on patients suffering from dental anxiety the dynamics of musical therapy should be considered.

Keywords: Musical intervention, dental anxiety, stress, effect of music, functional relaxation therapy, dental fear

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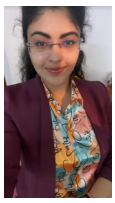

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1. INTRODUCTION

Dentist anxiety is the most common reason for patients avoiding dentist appointments and ignoring their oral health. Anxiety is a psychological phase that includes the perception of stress, intense restlessness, anxiousness, apprehension, and fear. Dental anxiety is an atypical fear of dental treatment and procedures, as well as nervousness about undergoing dental procedures [1]. Cattell first introduced the ideas of state and trait anxiety in the 1960s, and Spielberger has since developed and applied them[2-5]. Cattell and Scheier (1961) have pioneered the application of multivariate techniques to define and measure anxiety. In their research, phenomenological and physiological variables presumed to be related to anxiety have been studied with factor analytic procedures, notably such methods as the P-technique dR (differential R) technique and the Chain-P technique (Cattell, 1966). With this multivariate method, which allows for the study of the covariation of various measures throughout time, "state" and "trait" anxiety have regularly emerged as major personality determinants [2-5]. Complementary alternatives can be used in order to reduce the stress and anxiety of patients [1,6]. These include the establishment of preoperative education and patient education programs, as well as the application of complementary therapies like massage, hypnosis, reflexology, and aromatherapy. Music listening has the potential to be a potent anxiolytic because it can alter central and automatic nervous system processes, which in turn have a significant impact on physiological effects. According to some theories, music acts as a stimulant, diverting and distracting negative emotions like stress, anxiety, and fear and promoting relaxation[6-8]. Utilizing music as a therapeutic tool is primarily a 20th-century evolution. The rise in the use of music as an intervention in recent years may, in part, be credited to the increasing mass appeal of complementary therapies[7]. Potential benefits of musical interventions include reducing treatment-related exposure to frightful noises. Physiological patient functions like blood pressure and heart rate (HR) are influenced by musical interventions, but also emotional controls like perioperative anxiety levels and pain thresholds [8]. In the literature, various studies are reported, such as the application of musical therapy while performing dental procedures for the management of dental anxiety [9], musical intervention used in children to distract during dental treatment [10,11, 12], a study such as to evaluate the effect of music in pre-procedural state anxiety in hospital [13], in one study effect of music will cause any change in treatment or not was assessed[14], whereas in one study Music listening and S-IgA levels were compared in patients with dental treatment [15]. In the literature database, ample studies support that the effect of musical therapy reduces dental anxiety and, hence, said evolutionary era in dentistry. A need and novelty of this literature review is that it compiles information that includes musical intervention and its effect on dental anxiety. According to reports, using sedatives, hypnotics, tranquilizers, and other drugs has a variety of negative effects on the body. On the other hand, music therapy is a natural approach that has anxiolytic effects without these side effects. All branches of medicine, including dentistry, have used music therapy, and it is beneficial because it can divert the patient's attention away from painful stimuli [1]. This review aims to evaluate the effect of musical therapy on various dental procedures reported in the literature database

1.1. A Rationale of the study

The present study consists of reviews on the effect of musical therapy on physiological stress-related parameters such as blood pressure, heart rate, hormonal imbalance, and psychological stress-related factors such as state anxiety, nervousness, and restlessness. The study mainly focuses on the evaluation of musical therapy affecting dental anxiety. While performing various dental operations or if long waiting appointments are given, patients often suffer from dental anxiety. There are various stress relaxation therapies to reduce dental anxiety; however, this study is concentrated on musical therapy alone and its effects. Also, the study moderate's other parameters such as the age of the participants, the type of various musical interventions, and musical preference. Music therapies have been increasingly developed and utilized in the past few years to reduce stress in various situations and improve physical and psychological health by creating an environment that promotes relaxation and stress reduction. [1-5]. Therefore, it is time to recollect and replicate all the available information, electronic databases, and search engines such as PubMed, Web of Science, and Scopus, thus preventing loss of information and increasing statistical power.

2. DENTAL ANXIETY

The primary reason why individuals keep off receiving dental care and visiting the dentist is dental anxiety. According to studies, one in six adults struggle with dental phobia, and in children, the prevalence of dental phobia is 5.7% to 19.5%[9,10].

3. STRESS RESPONSE DYNAMICS

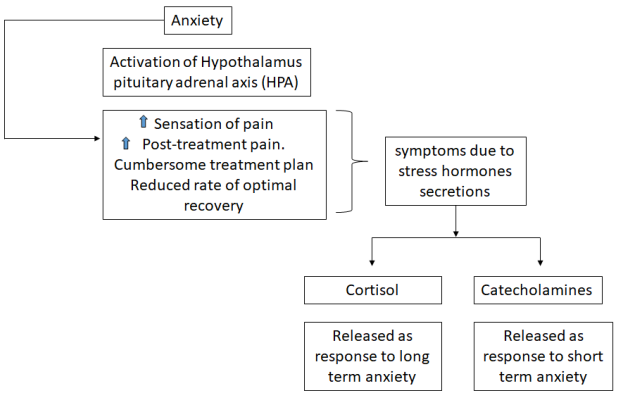

Fig 1: Dynamics behind stress response [16].

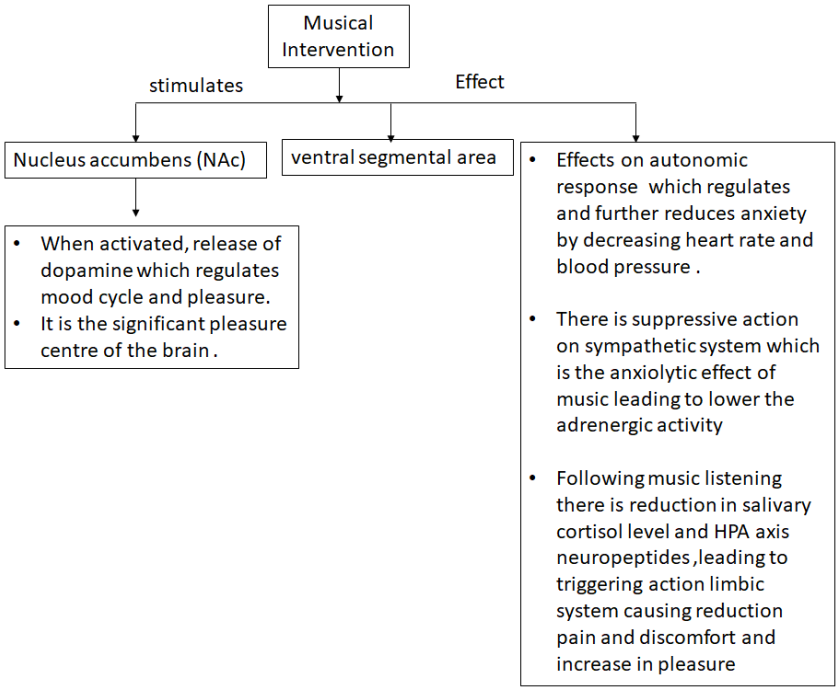

Fig 2: Dynamics of musical intervention and its effects[16]

4. ETIOLOGY OF DENTAL ANXIETY

Age and sex are the two main variables associated with dental anxiety, according to early studies[11]. Women experience dental anxiety at a higher rate than men do. According to studies, women between the ages of 30 and 45 have a higher prevalence of dental problems[12]. Some of these factors are

- Previous dental experiences, particularly unpleasant ones.
- Dental pain is the main factor contributing to dental anxiety. Patients who are anxious react to pain more quickly.
- Concern over potential pain and injury.
- Oral bleeds
- The visual appearance of injections and perception of local anesthesia.
- Rotary instrument noise: loud, unpleasant dental drill noises that can make people anxious.
- Pain when opening the mouth.
- Anxiety related to dental chair discomfort.
- An allergy-related fear.
- A need to understand the dentist's required procedures.
- Unknown-related phobia (the dentist).
- Concern over relatives or friends who have received absolutely awful dental care[1,17,18].

5. STRESS SYSTEM

The *stress system* is highly important and preserved in human beings. In physiology and medicine, the general definition of *stress* is introduced by Selye (1956): 'Stress is a general activation reaction to a stimulus that could mean both a challenge (in a positive way) and a threat (in a negative sense).' Aldwin (2007) emphasized the negative part and defined stress as the quality of an experience produced through a person-environment transaction that, through either overarousal or under-arousal, results in psychological or physiological distress (Aldwin, 2007; Riley & Park, 2015).[17]

5.1. Management and psychotherapeutic management of dental anxiety

Dental anxiety has been linked in studies to issues with children's behavior management[13]. Patients who experience dental anxiety also report higher levels of caries. Additionally, patients with dental anxiety have been found to have poor oral health as well as a higher incidence of missing and decayed teeth[14]. According to a study, skipping or ignoring dentist appointments causes a considerable deterioration in oral health, necessitating more invasive procedures and increasing patient anxiety. [1].

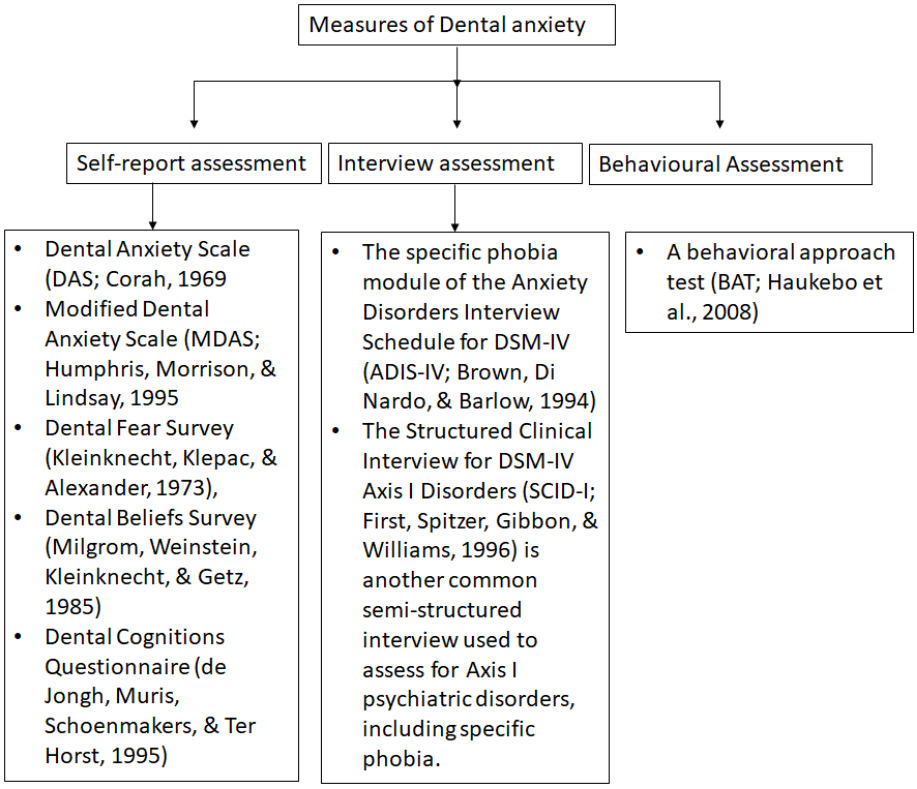

Fig 3: Measures of dental anxiety [19]

6. MANAGEMENT OF DENTAL ANXIETY [18]

Because the cause of dental anxiety is multifactorial, there is no single treatment. A thorough examination of the patient and identification of the source and extent of anxiety can assist the dentist in determining the appropriate treatment approach. Even the most innocuous events, such as communicating with the receptionist while arranging appointments or the clinic setting, can trigger anxiety. Thus, every component of the dental practice must be acceptable. (Figure No. 4)

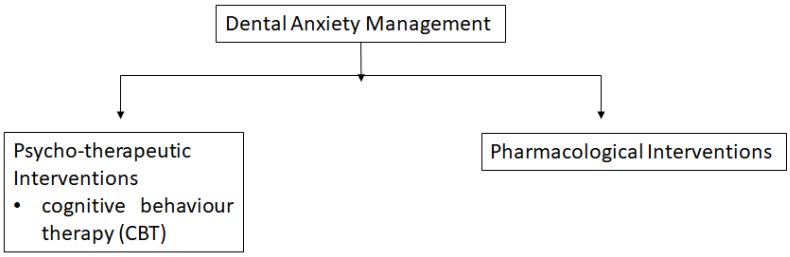

Fig 4: Dental Anxiety Management

Table 1: Psychotherapeutic management of dental anxiety [18]

Sr. no.	Psychotherapeutic management of dental anxiety
1.	Communication skills, rapport, and trust building: iatrosedative technique
2.	Behavior-management techniques
3.	Relaxation techniques: deep breathing, muscle relaxation
4.	Jacobsen's progressive muscular relaxation
5.	Brief relaxation or functional relaxation therapy
6.	Autogenic relaxation
7.	Ost's applied relaxation technique
8.	Deep relaxation or diaphragmatic breathing
9.	Relaxation response
10.	Guided imagery
11.	Biofeedback
12.	Hypnotherapy
13.	Acupuncture
14.	Distraction
15.	Enhancing control

16.	"Tell-show-do", signaling.
17.	Systematic desensitization or exposure therapy
18.	Positive reinforcement
19.	Cognitive therapy
20.	Cognitive behavioral therapy (CBT)

7. FUNCTIONAL RELAXATION THERAPY

For this therapy to be effective, the dentist should first ensure the patient feels comfortable. Following that, musical therapy should be incorporated into the treatment along with specific instructions.

7.1. Instructions given to the patients

- Keep headphones on and play music with low to medium volume while sitting in the dental chair.
- Calm down and let the eyes be closed for 3-5 sec to concentrate on the music playing on headphones.
- Let musical therapy do the work. Do you notice a change in awareness of your fear?
- Before starting the treatment, listen to the music for 10–15 seconds. Try to listen to the lyrics of the music.
- Pay attention to your awareness of your body. Do you notice any variation?
- After the pre-treatment musical intervention, dental treatment should start; in this phase, play soothing and calm music and ask the patient to try to focus on various musical instruments played to distract from dental phobia.
- Notice the lyrical sensation inside your ear. Feel the light and delighted atmosphere around yourself.
- Check your comfort.
- Do not worry about anything.[36]

7.2. Musical Intervention

Pitch, rhythm, dynamics, and common elements like dynamics, tone, and resonance are all incorporated in a structured manner in the art of synchronizing echoes to create music is a constant blend of melody and harmony. Different musical genres, styles, and types exist, such as classical, folk, contemporary, and religious music. The use of music to reduce or eliminate anxiety is referred to as audio-analgesia or audio-anxiolysis[15].

Fig 5: Musical therapy given to the patient during prosthetic treatment

Fig 6: Wireless headphones for musical therapy

Repetitive rhythms, a slow tempo, predictable dynamics, and persistent harmony characterize anxiolytic music. It can induce relaxation. As quoted by Munro and Mount, music therapy is strictly monitored, utilizing music to influence a person's physiological, psychological, and emotional status while receiving treatment for a disease or illness. There are two types of music therapy: active and passive[20]. Active music therapy is the application of music by qualified musicians or music therapists to promote health, well-being, and welfare. They use various musical techniques in clinics, hospitals, schools, or rehabilitation centers, such as composing music, singing, and playing different instruments. On the other hand, passive music therapy is called receptive music therapy. According to research, active music therapy is significantly more effective than passive music listening for treating medical conditions[21]. It is because music therapists train their musical compositions to the unique requirements of their patients[22]. (Figure no. 5, 6)

7.3. Effects of Music

Due to the following factors, music therapy has many therapeutic benefits and is highly effective when used in dental offices to treat anxious dental patients:

- Music therapy helps patients feel less stressed, anxious, and depressed.
- Music boosts immunity, eases pain, and reduces muscle tension.
- Promoting comfort and relaxation in the dental chair.
- Enhances the patient's disposition.
- Removes fear and increases confidence.
- Reduces blood pressure.
- Reduces heart rate.
- Reduces respiration rate.
- Encourages the patient to divert their focus away from uncomfortable stimuli.
- No fearful sounds of dental drills.
- Fosters a positive environment.
- Strengthening a sense of familiarity in an unfamiliar setting
- Improving doctor-patient relationship.

It is necessary to remember that for a musical intervention to be successful, the type of music, the patient's musical preferences, and the volume of the music must all be considered. Listening to well-known and beloved music or songs can rapidly and successfully assist the patient to appear less stressed. Music is hypothesized to inhibit pain pathways and receptors in the brain, reducing pain perception and increasing analgesic effect[23]. White noise effect is the practice of playing music before a procedure in order to reduce anxiety[24].

8. SUMMARY

While music acts as a stimulus and influences pain elimination, it masks unpleasant sounds and encourages relaxation. Parkin's studies examined the impact of music on reducing anxiety levels in children by playing 5 minutes of upbeat music before the dental procedure[25]. According to a 2010 survey by Tran of dentists and patients on their preferred anxiolytic interventions during dental treatment, 89% of dentists and patients prefer listening to music[26]. Hearing is the first sense humans employ in their everyday lives, and it develops before sight during the embryonic stage. Hence, it is more important than all other senses. Thus, sound in the form of music is a powerful stimulus that affects the nervous system of humans and stimulates brain waves that change their physiological and psychological states[27]. Every segment of the brain can easily be reached by music, which also activates cellular connections. Music and rhythm can change the lateral temporal lobe of the brain's neuronal activity. According to studies, rhythmic music encourages the brain waves to match that rhythm. The breathing and pulse also increase as the rhythm quickens, which improves focus and self-assurance[27]. The Joanna Briggs Institute documented the Best Practice Information Sheet by conducting various clinical trials and meta-analyses where musical therapy was given as an intervention to reduce pain and anxiety[7,28-31]. Based on clinical trials and meta-analysis, grades of recommendation were developed [7, 28-31].

8.1. Grades of recommendation

The grades to recommend musical therapy

1. music prior to surgery could help patients feel less anxious and require fewer sedatives to manage their anxiety (Grade A).
2. Anxious patients may find that music slows their breathing. However, in order to control the physical signs of anxiety, music should only be used in conjunction with standard care (Grade B).
3. The use of music may lessen pain brought on by operations or painful procedures, as well as the need for as many analgesic medications to manage the pain. Due to its minimal impact, It should not be utilized as the primary pain treatment strategy. (Grade A).
4. Flowing, non-lyrical music should have 60–80 beats per minute, low tones from strings, and little brass percussion. A volume level of 60 dB is also advised (Grade B).
5. According to the evidence, the following outcomes (Grade C) did not show enough improvement with music.

- The perception of well-being
- A reduction in the side effects of analgesic drugs
- The physiological parameters of anxiety
- There was no noticeable difference between the patients who chose the type of music and those who did not between the two groups of patients (Grade C).

An algorithm is presented as a means to inform clinical decision-making at the bedside in Figure 7.

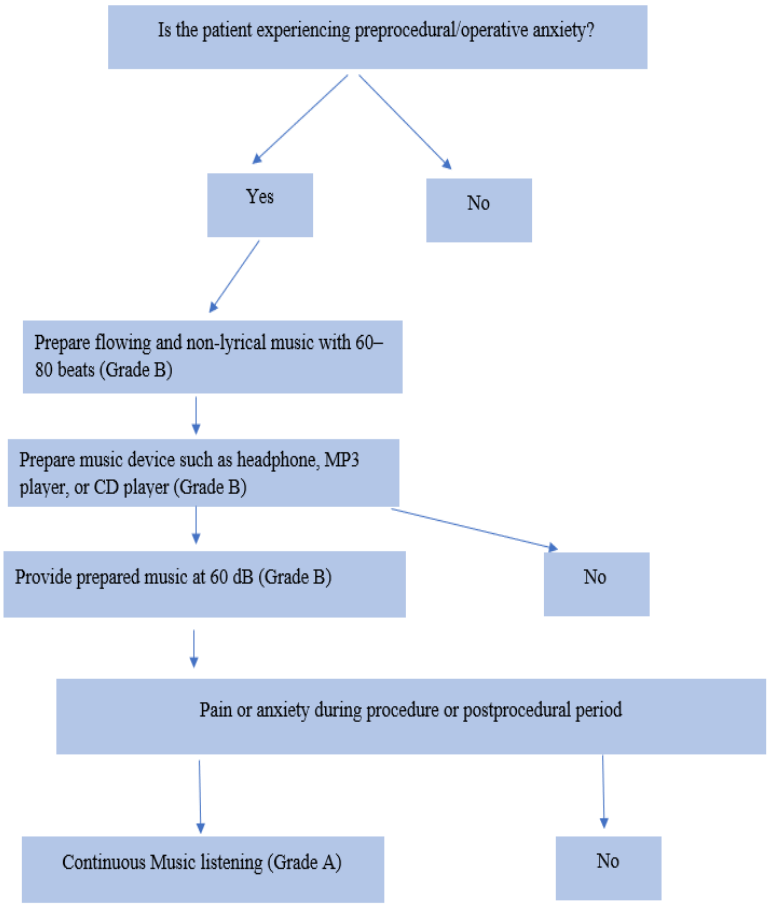

Fig 7: The grades to recommend musical therapy

SBP, DBP, and HR during the endodontic procedures were dramatically lowered by 432 Hz music presented to the individuals (n=100) during the root canal procedure, according to a clinical trial conducted by Di Nasso et al. in 2016.[8] According to many artists and musicologists, 432 Hz is most similar to natural human frequencies. N.W.N.A. Mustafa et al. carried out a study in 2020 to examine how self-preference music prevents gagging in patients (n=25) undergoing dental impression procedures. The degree of gagging was then assessed using self-reported Gagging Problem Assessment (GPA-pa-SF) questionnaires. The identical patient's maxillary imprint was taken twice, at two distinct times[32]. An examination of a novel audio pillow with hypnosis text from a prospective, comparative perspective and soothing music was done to lessen anxiety in dental implant surgery patients (n=82). Six months were spent on the study. Patients' subjective levels of fear were gauged using the Aachen Dental Treatment Fear Inventory (AZI) questionnaire and visual analog scales. During surgery, the average diastolic blood pressure and heart rate rose in the control group but decreased in the hypnosis group. Therefore, patients who listened to music while having dental implants reported feeling less anxious[33]. The treatment and control groups were randomly allocated to the subjects (n=44). While receiving a root canal, members of the music group wore headphones and listened to relaxing music. Participants in the control group wore headphones, but no music played. Vital signs of the individual were evaluated [34]. Patients commonly experience severe preoperative anxiety before having their impacted mandibular third molars (IMTM) removed. They may become more vulnerable to unstable vital signs and more sensitive to discomfort. The study included participants (n=219) who had had IMTM surgery. The music of their choice was played from when the music-treated group entered the operation room until the surgery was completed[35]. On 120 pediatric patients, a clinical experiment was conducted in 2012 to evaluate the usefulness of musical toothbrushes. The musical toothbrush group showed higher improvements over the course of the follow-up periods. When a child is listening to music, they are more motivated to brush their teeth and are more engaged. The child wants to play with a toy while brushing their teeth. As a result, kids can brush more frequently and correctly[36]. A study was done in 2012 to evaluate the effectiveness of specific music therapy strategies in various dentistry specialties. Many anticipated dental operations were performed for the first time or were disliked by the patients. The outcomes of pilot studies were used to develop a regular visitation plan. Kiery claims that the investigations began with the use of music therapy. Then, using Schwabe's description as a guide, a specific sort of regulated individual music therapy was carried out[37]. The majority of people concur that music is the best and simplest means of communication. The humanities, social sciences, and medical fields highly value music therapy, which is applied in many therapeutically connected fields[37]. A 2013 clinical investigation found that music can help patients feel less uncomfortable while receiving orthodontic treatment. The music group (n=165) showed noticeably less pain than the blank group. Music can aid in pain control when receiving orthodontic treatment. Extroverted patients do better than introverted ones, and steady-minded patients perform better than irritated ones [38]. Male patients benefit more from music therapy for pain alleviation during orthodontic treatment than female patients do.

9. CONCLUSION

Dental anxiety begins to increase as the patient sits in the waiting room and continues to rise until the procedure is completed. There is a need for complementary therapy to overcome this stress. As it was wisely said by great musician Bob Marley, "One good thing about music, when it hits you, you feel no pain," holds in the medical field. The music resonates when the discomfort penetrates a nervous patient in the dental clinic. In dental clinics, playing music with each patient is advised as an alternative distracting maneuver to lower patients' anxiety levels. A pleasant environment in the dental clinic with minimal tension and anxiety will help to bring out a magnificent dentist-patient relationship and a successful treatment. As a result, music therapy in the dental clinic must be implemented in daily dental practice.

10. AUTHORS CONTRIBUTION STATEMENT

Ankita Pathak formulated and gathered all the data. Mithilesh Dhamande, Seema Sathe, and Smruti Gujjelwar gave inputs and ideas and analyzed data to design the manuscript. All the authors kept effort into structuring and designing the manuscript to make the review more informative and knowledgeable**.**

11. CONFLICT OF INTEREST

Conflict of interest declared none.

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