

Effect of music intervention during therapeutic extraction using controlled, split-mouth study

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Introduction

The modern lifestyle is characterised by increased stress, depression, and anxiety. Anxiety is defined by the American Psychological Association (APA) as a sensation of stress, anxious thoughts, and high blood pressure (BP) ^[1]. Dental anxiety (DA) is characterised as

a patient's nervousness, stress, and tension during a dental treatment procedure, manifested by increased sensitivity to pain, decreased tolerance, and even the rising problem of avoiding or refusing to have teeth extracted. ^[2,3]. This could be due to a long wait time, a lack of psychosocial support, a first-time extraction

schedule, a fear of using a syringe to provide local anaesthesia, or uncertainty about the procedure's outcome [4]. As a result of unrelieved anxiety and stress, patients may experience physiological disturbances, a reduced immune response, and altered cardiovascular functioning such as tachycardia, increased core body temperature, heightened blood pressure, and nausea, which may have a direct impact on clinical outcomes. [5-7]. These signs and symptoms could be the result of stress hormones like cortisol and catecholamines being released (noradrenaline and adrenaline). While cortisol is the stress hormone released in response to long-term anxiety, catecholamines are the stress hormones released in response to short-term anxiety. Several anti-anxiety medications are available, but due to the negative side effects of drugs used to treat anxiety and depression, as well as their ineffectiveness in some circumstances, researchers are looking for a non-pharmacological and non-invasive treatment for these diseases [8]. As a result, a multidisciplinary approach is required to reduce anxiety and physiological disruptions in in-patients undergoing extraction.

It has long been known that sound or music can be used as a therapeutic therapy. Classical music is one of the most popular music genres in medicine. Classical music has long been renowned for its ability to reduce tension due to its peaceful and soothing speed [9,10]. Music intervention is a psychological therapy with a number of benefits, including low cost when utilised in outpatient treatment, no significant physical side effects, and a quick effect.

Despite the fact that some studies have found music to be useful in lowering anxiety, others have found the exact reverse. The goal of this study was to explore the usefulness of music therapy in reducing anxiety and

stress in patients undergoing extraction, based on these contradictory previous study results.

Methodology

Three hundred and forty-two participants (184 male, 158 females; aged 18-30 years old) who came to the Department of Oral and Maxillofacial Surgery, Indira Gandhi Institute of Dental Sciences, Puducherry for a therapeutic extraction, were recruited for this study. Prior to the start of the study, an ethical clearance was obtained from the Institutional Ethical Committee and all participants gave their written consent for their participation in the current study and the usage of any of their photograph(s), that was taken during the study that was related to the study procedure, for all possible publication related to the study.

The inclusion criteria for the study include patients indicated for therapeutic extractions of all 4 premolar. The exclusion criteria for the study was patient not willing for study, patient with hearing problems, medically compromised individuals and pregnant women.

The participants were sorted into group 1 (Music Therapy) and group 2 (controls). The participants allotted to the experimental group listened to music for the entire procedure and those allotted to control group did not listen to music for the entire procedure. For both the groups all the parameters (Systolic Blood pressure, Diastolic Blood pressure, Heart rate, Respiratory rate, Saturation) were measured and recorded before the procedure, before administration of LA, during administration of LA, at the time of procedure and immediately after the procedure.

The surgical process was standardised to control for variance in surgical ability among the surgeons, and the number of participating surgeons was limited to two who

were knowledgeable with the study's goal and standardised surgical procedures. The surgical department mandated that all perioperative treatments and surgeries be performed in the same way. After surgical draping, an impregnated cotton roll was used to apply a topical anaesthetic to the injection site, and numbness of the mucosa was confirmed. The surgical field was anesthetized by mucosal infiltration for the maxillary premolars and by blocking the mental nerve for the mandibular premolars, using 1 ampule of 2% lidocaine and epinephrine (1:100,000). The first check for mucosal numbness was performed 5 minutes after injection with periodontal elevator and additional infiltrative injection of anaesthesia was performed if necessary. The surgeon extracted the premolars with the appropriate forceps and minimal injury to the periodontal tissue after examining the anaesthetic status of the mucosa. Participating surgeons were educated before the study not to implement procedures such as specific psychosomatic pain control or sedation. If the patient complained of intermittent pain or discomfort during the procedure, a limited volume of additional anaesthetic solution was administered, and the procedure was delayed until patients discomfort subsided. After extraction routine postoperative instructions were given. The patient chose a list of favorite songs from a prepared music list during the preoperative meeting, which included classical music, pop songs, folk songs, hymns, and country songs. Patients were instructed to select at least 5 songs to listen to while undergoing surgery. Patients were asked to propose their own favourites if

none of the songs on the list appealed to them. The patient selected a suitable volume level, and headset postures were simulated and recorded. The picked songs were played continually and randomly throughout the operation once the patient arrived in the operating room. Using a control button, the patient was able to adjust the level of the music during the procedure. The music was temporarily interrupted and then restarted by the patient after the surgeon wanted to communicate with the patient about the surgery or to request cooperation.

Results

A total of 342 participants undergoing therapeutic extraction participated in this study, out of which 57% of the participants were males (Figure 1). Participants within the age group of 19-24 years comprised of 48% of the study, followed by the participants of the age group of 13-19 years which comprises of 31% of the study and the rest of the participants belonged to the age group 24-31 years (Figure 2). From Figure 3 it is seen that 51% love listening to music while 9% does not (Figure 3).

As presented in Table 1, there were 102 male (56.6%) and 78 female (43.4%) patients in the music-treatment group and 82 male (50.7%) and 80 female (49.9%) patients in the control group. Using a 2-homogeneity test, no significant differences based on gender distribution were found between groups (P -0.041). In addition, there were 140 participants (80.8%) whose age was younger than 24 years in the music-treated group and 129 (76.7%) in the control group. The 2 groups were homogenous with respect to age distribution (P -0.028).

Characteristics	Category	Music treatment	Non-music treatment	P value
Gender	Male	102 (56.6%)	82 (50.7%)	0.041
	Female	78 (43.4%)	80 (49.3%)	
Age	13-19	56 (32.3%)	50 (29.5%)	0.028

	19-24	84 (48.5%)	79 (47.2%)	
	24-30	33 (19.2%)	40 (23.3%)	
Music preference	Much	82 (47.9%)	86 (50.2%)	0.024
	Medium	64 (37.4%)	61 (35.6%)	
	Little	25 (14.7%)	24 (14.2%)	

Table 1:

Parameter	Group	Before the procedure	Before administration of LA	During administration of LA	At the time of procedure	After the procedure
Systolic Blood pressure	Experimental	123.51	122.63	124.44	124.44	123.51
	Control	123.51	126.96	126.96	134.47	123.51
Diastolic Blood pressure	Experimental	80	80	79	80	80
	Control	80	80	80	91	80
Heart rate	Experimental	82.15	82.39	82.09	82.64	81.95
	Control	82.15	84.41	86.82	92.43	84.25
Respiratory rate	Experimental	21.02	20.51	21.09	21.61	20.71
	Control	21.02	21.91	23.59	22.43	20.91
Saturation	Experimental	99.58	99.61	99.65	99.32	99.44
	Control	99.58	99.61	99.65	99.32	99.44

Table 2:

As presented in Table 2, we can notice that there was no change between the experimental and control group in the measurement of systolic blood pressure before the commencement of the procedure and after the procedure whereas there was significant change noted before administration of local anaesthesia, during administration of local anaesthesia and during the procedure. There were no significant changes noted in the measurement of the diastolic blood pressure and saturation in all the groups. Significant changes can be noted in the measurement of heart rate and respiratory rate noted before administration of local anaesthesia, during administration of local anaesthesia, during the procedure and after the procedure but no change can be noted in both the groups before the procedure

Discussion

Dental anxiety is common, and it has a considerable negative impact on the patient's self-esteem, professional practice, and social influence. Dental anxiety has been the subject of long-term studies by a number of academics. Because of heterogeneity in study subjects and measures, the prevalence of dental anxiety in adults varies greatly across countries and regions. According to researchers, the pathophysiology of dental anxiety has particular characteristics. Despite many years of research, many epidemiological issues about adult dental anxiety have not been fully proven, and the frequency of dental anxiety in different regions is not the same.

Female anxiety was found to be higher than male anxiety in this investigation. This conclusion was in line with the

findings of a number of previous research^[11-13]. This could be due to the fact that females exhibited higher dread in psychological aspects than males^[11]. Females' ability to manage with dental visits is now regarded to be significantly lower than males', and their desire to self-regulate, as well as their poor coping abilities during actual dental visits, may exacerbate their psychological stress. On the other hand, etiological research revealed that one of the main causes of DA is a fear of pain. Females have lower pain thresholds than males, and they perceive and handle pain differently^[14]. Females may have a higher degree of DA than males as a result of the aforementioned factors. However, some researches, such as Locker et al.^[15], came to the conclusion that there was no significant link between gender and DA. Gender was a prevalent and important factor in recent DA studies. According to most investigations, the DA difference between males and females found that female patients were more likely to have DA. The surgeon should pay more attention to the reaction of female patients during the communication and treatment process, and take appropriate efforts to minimise anxiety.

Acute alterations in the autonomic nervous system might occur as a result of pain, anxiety, and uneasiness connected with dental treatment. Acute changes in autonomic nervous system activity have an impact on circulatory dynamics and can lead to problems including high blood pressure and the vagal reflex^[23,24]. Thus, keeping track of changes in autonomic nerve activity during dental treatment could assist prevent problems like hypotension and bradycardia. Data on this topic is conflicting in the literature; while some research show that music lowers heart rate and blood pressure^[25,26], it has also been shown to be ineffective in other studies^[27].

Music has regularly been shown to reduce anxiety in patients through stress-relieving effects^[8,16-18]. These conclusions are supported by the findings of our investigation. Another theory about music's capacity to alleviate anxiety is that it might help people focus their attention away from stressful events and generate happy moods and feelings, hence lowering anxiety levels.^[19]. Similarly, music listening interventions reduced SBP, DBP, PR, and RR, which helped to normalise physiological responses. The music listening intervention suppressing sympathetic activity, resulting in decreased adrenergic activity and autonomic cardiovascular rhythm control, could be associated to the reduction of anxiety as well as the regularisation of physiological responses.^[20,21].

According to Kim et al listening to the patient's selected music significantly reduced intraoperative anxiety in 219 patients who had their third molar teeth extracted. Patients should also bring their own music, according to clinical standards 9. In line with the literature, the vast majority of patients in this study stated that listening to music helped them relax during 3rd molar tooth extraction, however they preferred the music they chose^[22].

Conclusion

From this study, it is evident that music helps to reduce anxiety during therapeutic extraction in adolescents aged between 18 and 30 years. Also, it was observed that women had higher levels of anxiety in every period and the patients preferred their own favorite genre.

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