ASSESSMENT OF THE EFFECT OF MUSIC THERAPY FOR REDUCTION OF ANXIETY LEVELS IN PATIENTS UNDERGOING SURGICAL EXTRACTION OF IMPACTED THIRD MOLARS UNDER LOCAL ANAESTHESIA - A RANDOMIZED CONTROLLED TRIAL.

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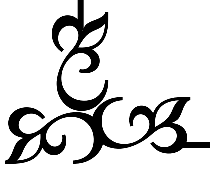

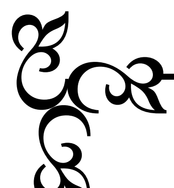
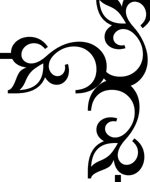

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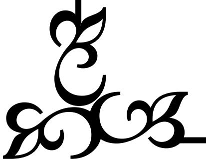
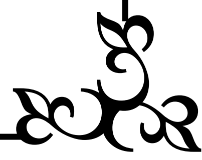

LIST OF ABBREVATIONS

IMTM	–	Impacted Mandibular Third Molar
Pre-Op	–	Preoperative
BP	–	Blood Pressure
PR	–	Pulse Rate
RR	–	Respiratory Rate
HR	–	Heart Rate
LF	–	Low Frequency
HF	–	High frequency
Hb	–	Hemoglogin
BT	–	Bleeding Time
CT	–	Clotting time
RBS	–	Random blood Sugar
VAS	–	Visual Anxiety Scale
MDAS	–	Modified Dental Anxiety Scale

ABSTRACT

Purpose: Acute changes in the autonomic nervous system might result from pain, anxiety, and uneasiness associated to dental operations. Although it's well understood that music can help patients relax while receiving dental care, its effects are yet unknown. The authors investigated how the autonomic nervous system and psychological state were affected by listening to music during the extraction of the impacted mandibular third molar and proposed that doing so would reduce sympathetic nerve activity and anxiety.

Materials and Methods: Total of 120 patients with IMTM (Impacted mandibular Third Molar) participated in this study. Participants were randomised into a control group (60 individuals) or music-treated group (60 subjects). During pre-operative examination, patient demographic data was collected along with the patient's favourite songs. For the music-treated group, their chosen music was played from the beginning of the procedure until it was finished. The Dental Anxiety Scale and the Visual Analog Scale were used, respectively, to measure perioperative anxiety and pain perceptions. Throughout the procedure, the patients' vital signs—blood pressure, heart rate, and breathing rate—were watched. One-way analysis of covariance using perioperative anxiety as a covariant was performed to compare intraoperative anxiety levels and perioperative perceptions of pain between the 2 groups. Repeated measures analysis of variance was used to compare changes in vital signs across surgical stages between the 2 groups.

Results: During surgery, the patient's vital signs varied dramatically depending on where the operation was in the process. Vital indicators for both groups climbed from baseline, peaked at the moment of the initial incision, dropped swiftly, and

subsequently plateaued within normal ranges. There were no significant differences between groups in blood pressure; however, the music-treated group showed a significantly smaller change in heart rate than the control group. The music-treated group reported significantly less intraoperative anxiety than the non-music treated control group when controlling for preoperative anxiety levels.

Conclusions: According to the results obtained in this study, playing music while having Impacted mandibular 3rd molar extracted reduces anxiety following the procedure by suppressing sympathetic nerve activity throughout the incision, flap reflection, bone removal, and crown separation. Future research will concentrate on the mechanisms involved and how to stop systematic occurrences from occurring.

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INTRODUCTION

One amongst the top five most feared scenarios is dental care, which is also one of the leading causes of skipped dental appointments. For patients, having a dental extraction is quite distressing. The mandibular 3rd molar extraction produces the highest anxiety when compared among other tooth extractions.

The second most frequent obstacle to receiving dental care is dental phobia. This fear could not only postpone a required checkup but also have a significant impact on many other areas of general health. However, clarifying this problem remains an immense challenge for researchers and practitioners due to the lack of a precise methodology. Extractions have drawn a lot of attention as the dental operation that causes the most anxiety. This therapy typically entails challenging techniques, including as anaesthesia and drilling, which patients have rated as two of the most terrifying aspects of dentistry.

1 of the most frequent oral and maxillofacial surgery procedures is the removal of an impacted mandibular third molar (IMTM). OMFS surgeons consider Impacted mandibular 3rd Molar surgery as a relatively straightforward procedure with little hazards. This surgery is usually perceived by patients and general dentists as being rather frightening, despite the fact that it is a difficult procedure with numerous intra- and postoperative complications that may be more serious than initially anticipated by the patient. Along with the hazards to surgical outcomes, there are additional emotional and psychological factors in this surgery that endanger doctor-patient relationships.[1]

Patients who receive IMTM surgery frequently experience intense anxiety as a result of their intensely negative expectations, which has a detrimental impact on their physiologic states and may lead to serious treatment problems.[2]According to a prior study, approximately half of individuals having their third molars extracted anticipate discomfort. [2] Preoperative anxiety levels that are higher are known to be linked to higher perioperative pain perception, higher intraoperative anaesthetic needs, and higher postoperative analgesic requirements. Additionally, due to this psycho-emotional instability, hemodynamic alterations may also be brought on, which could have detrimental cardiovascular implications during surgery.

“To reduce perioperative mental anguish and anxiety, many sedative drugs are widely utilised; nevertheless, these drugs frequently have unfavourable side effects, including as respiratory depression, hypothermia, low BP, & even coma. 1 Psychological therapies are perioperative anxiety treatment alternatives to medicine. One of these strategies that has been proven to be a non-invasive, affordable, and effective way to lower patient perioperative anxiety levels is music therapy during surgery.”

According to Steelman et al 2016[2], musical intervention was connected to lower blood pressure in individuals receiving local anaesthetic. Lepage et al[4] discovered that the use of music during surgery assisted patients reduce their anxiety about the procedure and needed sedatives less frequently. Marwick[6] also noted that music therapy during a procedure under local anaesthetic can promote calmness, lower blood pressure, and stabilise heart rhythms.

In Patients With Dental Anxiety, Changes Induced By Music Therapy To Physiologic Parameters Showed that the treated group with music therapy experienced significant differences in salivary cortisol concentration, systolic and diastolic pressure, heart rate, body temperature, and stimulated salivary flow and came to the conclusion that music therapy has a beneficial effect in controlling dental anxiety.

Stress Reduction via Audio Distraction in Anxious Pediatric Dental Patients discovered that "Audio distraction" is effective in reducing anxiety in paediatric dental patients, leading researchers to draw the conclusion that "Audio distraction" did significantly reduce anxiety in paediatric patients.

“Musical interventions have the additional benefit of reducing exposure to ominous noises in the operating room because patients are continuously exposed to auditory stimuli during IMTM surgery under local anaesthesia, including the alarming sound of monitoring systems, the metallic sound of surgical instruments, and the professional conversations of surgical staff members. [3-4] The type of music, the loudness of the music, and especially the patients' musical tastes to music should all be taken into account when using musical interventions to lessen anxiety levels in patients having IMTM surgery. [2] As a result, gathering information regarding musical tastes during preoperative consultations is required.” [2,3]

Acute changes in the autonomic nervous system's activity have an impact on circulatory dynamics and can lead to problems including elevated blood pressure (BP) and vagal reflex. [1,2] Therefore, it may be helpful to prevent difficulties during dental treatment to keep an eye on changes in autonomic nervous activity. The monitoring of autonomic nerve activity during dental treatment has reportedly benefited by heart

rate variability (HRV) studies in recent years.[3-5] HRV can noninvasively track and measure changes in autonomic nerve activity in real time while receiving dental care.[6] HRV, which is assessed as a variation in the RR interval on the ECG and is broken down into components by spectrum analysis, is a variation in the sinus node ignition period.

The low-frequency (LF) component is defined as a frequency between 0.04 and 0.15 Hz, and the high-frequency (HF) component is defined as a frequency of at least 0.15 Hz.

While the LF component reflects both sympathetic and parasympathetic neurological activity, the HF component is the product of parasympathetic nerve activity. As a result, the LF/HF ratio, which measures the sympathetic nervous system activity.[6]

Anxiety and tension can cause complications during surgical procedures and music has been widely used for alleviating anxiety and tension during dental treatment.[7-11] Although there has been extensive research on the subject, there is still disagreement over how music affects the autonomic nervous system. For patients, having a dental extraction is quite distressing with mandibular third molar extraction giving people the greatest worry. [5,12,13] The authors are aware of one study that looked at the benefits of music therapy during endodontic treatment[3], but none that has looked at the benefits of music during dental extraction.

So, in this study, the authors studied and analysed the impact of listening to music on autonomic nerve activity, circulatory dynamics, and psychological state during extraction of the impacted mandibular third molar. Dental anxiety affects 10–

20% of adults and up to 43% of children and adolescents, making it a serious problem in dental care for adults, children, and adolescents.[2] Dental fear frequently causes people to put off getting dental care, which can seriously harm their oral and dental health.[5-10] Costs of dental care may significantly rise as a result of this degeneration.

One such strategy is listening to music for anxiety control, which is well-liked by parents, paediatric and adult patients, and practitioners. It works well for stress relief and relaxation. There is a tonne of research to support the effectiveness of music therapies in lowering anxiety in a range of medical patients. Evidence indicates that music interventions have a moderate to large effect on anxiety in patients with cancer[9], patients with coronary heart disease, and patients on mechanical ventilation[10]. In addition, anxiety during dental treatments may lead to extended duration of dental appointments, another factor impacting the overall cost of care[11]. Children experience more dental anxiety, which seems to diminish with age. Treatment success depends on controlling a child's anxiety so that they can cooperate as dental patients.

As the main cause of dental anxiety has been identified as pain and the dread of pain, managing discomfort is a crucial concern. Additionally highlighted as important obstacles to receiving dental care are fear and anxiety, these conditions affect both adults and kids with special needs. [12] In contrast to people without ASD, adults with autism spectrum disorder (ASD), for instance, exhibit higher levels of dental anxiety[13]. Young children and those with special needs frequently exhibit resistive behaviours that could compromise the safe administration of dental care due to their lack of comprehension of dental procedures and their perception of being compelled to receive them. [14]

Conscious sedation and anxiolytic medications are frequently used on individuals who are extremely anxious. However, studies show that due to perceived medical hazards, both adult patients and parents of young kids with dental anxiety prefer non-pharmacological therapies. Additionally, dental treatment costs are greatly increased by pharmacological sedative techniques. These factors have led to an increase in the use of behavioural control strategies in dental care. There is some preliminary evidence that behavioural therapy of dental anxiety may be preferable than anxiolytic medications.

Music listening for management of anxiety is one such intervention and is widely acceptable to parents, paediatric and adult populations and practitioners.

There is a plethora of research to support the effectiveness of music therapies in lowering anxiety in a range of medical patients. According to the existing evidence, “Music therapies have a modest to significant impact on anxiety in cancer patients, people with coronary heart disease, and people who require mechanical ventilation”.

Therefore, in this study, the authors evaluated and analysed the effect of listening to music during extraction of the impacted mandibular 3rd molar objectively.

AIM OF THE STUDY

Assessment of the effect of music therapy for reduction in anxiety levels of patients undergoing surgical extraction of impacted third molar under local anaesthesia.

Objectives

1) To evaluate the effect of music therapy in patients undergoing surgical extraction of impacted third molar under local anaesthesia by assessing patients' vital signs.
2) To assess the preoperative, intraoperative and postoperative anxiety levels using the Modified Dental Anxiety scale (MDAS).

HYPOTHESIS

Null Hypothesis

Music Therapy has no effect in decreasing participants anxiety levels undergoing impacted third molar extraction under local anaesthesia.

Alternate Hypothesis

Music Therapy has significant effect in decreasing participants anxiety levels undergoing impacted third molar extraction under local anaesthesia.

REVIEW OF LITERATURE

1) A scale to gauge dental anxiety was created in **1969 by Stephen J. Illig, Elliot N. Gale, and Norman L. Corah.** The questionnaire consisted of four multiple-choice questions that probed the patient's perceptions of going to the dentist, sitting in the waiting room while operations are completed, and anticipating drilling and scaling.

2) **The STAI** was established **by C. H. Spielberger (1968, 1977**) in the context of his research on the relationships between anxiety and learning ability and reflected shortcomings in pre-existing measures of anxiety. He suggested a scale with classes for states and traits. State anxiety describes fleeting unpleasant emotions like tension, uneasiness, or worry that are frequently accompanied by the activation of the autonomic nervous system. It indicates how dangerous a person thinks his surroundings are. A person's propensity to perceive situations as threatening and, as a result, to feel state anxiety in tense circumstances is known as trait anxiety. Trait anxiety is not directly visible, but when stress is present, it manifests. The STAI State form has 20 statements, and the patient's anxiety at a particular moment is assessed using their responses. The STAI Trait form has 20 statements, and the patient's underlying level of anxiety is determined by the responses to these statements. According to the patient's level of agreement, each statement in the STAI-State Trait is graded on a scale of 1 to 4 points. The aggregate score for each scale is between 20 and 80, and it is divided into three categories: minimal or no anxiety [(20–37),] moderate anxiety [(38–44),] and high anxiety [(45-80).]

3) **The Dental Fear Survey (DFS), developed by Ronald A. Kleinknecht, Klepac, and Alexander in 1978,** consists of 20 items divided into three categories: avoiding, physiological reactions, and specific dental stimuli. Patients' dental anxiety is assessed using a Likert Scale that ranges from 1 (no fear) to 5 (extreme fear), with 63 being the lower limit for fear.

4) **The Dental Fear survey was factor analysed and cross-validated by Ronald A. Kleinknecht, F. Dudley McGlynn, Robert M. Thornidike, et al. in 1984.** Through cross-validation, it was determined that avoidance, physiological responses, and certain dental stimulation variables were constant across four geographically and demographically varied groups. Based on the tooth's angulation, depth, and connection to the ramus, Pederson (1994)[41] assigned a difficulty index for removing impacted third molars.

5) **In 105 patients, P. Earl (1994) conducted** a study on the patients' anxiety related to the third molar operation. Preoperative and postoperative questionnaires were given to them, and the results were used to determine the correctness of the preoperative explanation, the differences in expectations, and the feature that most worried the participants. Results showed that most patients had concerns that were as anticipated or even less severe. Some people discovered that paraesthesia (13%) and discomfort (12%) made experiences worse. The most crucial elements for third molar surgery patients are reassurance and effective pain management; reassurance should begin at operation scheduling rather than admission**.**.

6) **In a study conducted in 1994 by Warren P. Vallerand, April Hazard Vallerand, and Marc Heft**, 40 patients scheduled to undergo surgical extraction under local anaesthesia and intravenous conscious sedation were divided into

two groups at random. Members of the treatment group received extensive instructions on how to use analgesics as well as descriptive information on possible sequelae in the postoperative period. Members of the control group received general, open-ended guidelines for postoperative wound care. These findings showed that providing more postoperative information significantly increased pain alleviation and the associated satisfaction with pain control without increasing analgesic use..

7) **Modified Dental Anxiety Scale/MDAS, a questionnaire created expressly to gauge anticipatory fear and anxiety, was provided by Humphris GM et al. in 1995.** Each question on this 5-item scale for self-rating offers a range of five possible answers, from comfortable to extremely agitated. On a scale of 0 to 25, 5 to 10 was deemed to be low anxiety, 11 to 18, moderate anxiety, and 19 to 25, extreme anxiety.

8) **In their 1999 study, David Locker, Andree Liddell, and David Shapiro** used a population-based sample to evaluate the psychological validity of identifying dentally nervous people among 1480 randomly chosen adults. The findings revealed that every subject had a severe anxiety of getting a cavity filled and that their cognitive and behavioural reactions to dental care were generally comparable. According to the overall findings, dental anxiety is a complicated dread with a variety of components.

9) In a study conducted by **G.W. Bell and P.J. Kelly in 2000,** the researchers investigated the effects of midazolam dose, operating time, and surgical technique on the levels of anxiety and amnesia in 60 patients. They discovered that blood pressure, forgetfulness, pulse rate, or preoperative anxiety were not

related to the amount of sedation needed. Significant postoperative anxiety levels were decreased with sedation.

10) **In a cohort of 1424 Saudi female adolescents, Ebtissam M. Al-Madi and Hoda Abdel Latif's in a study conducted in the year 2002** examined the incidence of dental anxiety and terror in the present. They employed the DFS and DAS questionnaires for assessment. They demonstrated that teenagers who had an extraction on their previous visit had the highest levels of anxiety and panic. Adolescents who had recently visited the dentist had higher levels of dread and anxiety, whereas adolescents who had never visited the dentist exhibited lower levels of these emotions. With regard to oral prophylaxis, the degrees of worry and panic were lowest. One can draw the conclusion that those who have experienced severe oral exposure frequently experience worry and fear.

11) **11) James D. Bader, Arthur J. Bonito, Daniel A. Shugara, and colleagues** conducted a systematic review in 2002 to find any additional risks of adverse cardiovascular outcomes to hypertensive patients associated with the use of epinephrine-containing anaesthetic solutions and epinephrine-impregnated retraction cords. According to the findings, epinephrine administration caused a slight, non-significant rise in both systolic and diastolic blood pressure in uncontrolled hypertension individuals. They came to the conclusion that there was little recorded evidence of an elevated risk for negative consequences, and those that did occur were mild.

12) **A study by Mats Mehrstedt, Sven Tonnies, and Idis Eisentraunt** from 2004 found that younger people were more afraid than older people and that women were more afraid than men. Comparing patients of different socioeconomic

position, those with lower socioeconomic status had slightly higher dental issues. They came to the conclusion that dental phobias have a negative impact on quality of life.

13) **Yusa H, Onizawa K, Hori M, Takesa S, et al. (2004)** conducted research to quantify the anxiety related to third molar extraction in college students, and to compare the measured anxiety before and after extraction, between men and women, first and second extraction, impaction versus non-impacted tooth extraction, and in terms of first and second extraction. For 108 pupils, the State-Trait Anxiety Inventory in Japanese was used. With the use of STAI, the level of anxiety among students having third molar extraction may be objectively assessed.

14) **In a study conducted in 2004 by Hasan Garip, Osman Abali, Kamil Goker, Ulku Gokturk, and Yildiz Garip,** 120 Turkish patients who had their third molars extracted underwent anxiety assessments. The Spielberger's State Trait Anxiety Inventory (STAI) and the Amsterdam Preoperative Anxiety and Information Scale (APAIS) were used to assess anxiety**.** They demonstrated that patients who wanted a lot of information were more anxious, as were patients who had never had an operation before. They also demonstrated that there was no difference in anxiety scores between patients who had previously undergone local anesthesia and those who had not, nor was there any difference in anxiety as measured by trait scores. Cooperation between patients and surgeons is directly impacted by a nervous patient, who may have an adverse effect on other waiting room patrons.

15) **Patients who sought treatment for the extraction of their third molars were evaluated for dental anxiety by Lucia Lago Mendez, Marcio Diniz Freitas, Carmen Senra-Rivera, et al. in 2006**, along with any potential links to general trait anxiety. Utilizing the Dental Fear Survey (DFS), Corah's Anxiety Scale (DAS), and State Trait Anxiety Inventory's state anxiety scale, dental anxiety was assessed (STAI). The findings revealed a strong positive association between the DAS and DFS scores for anxiety. The three dental anxiety scores all notably shown positive connection with one another. They also demonstrated that only in the case of trait anxiety were differences between men and women statistically significant. They came to the conclusion that a patient's propensity for dental anxiety may be accurately predicted by their trait anxiety.
16) **According to Malamed (2007),** increased anxiety and dread of dentistry might exacerbate existing medical conditions like angina, asthma, and other stress-related issues like hyperventilation and vasodepressor syncope. The patient's psychological capacity to tolerate the stress connected with the intended treatment is one of the objectives of patient evaluation, he added. The doctor can detect the existence of anxiety using one of three approaches. The art of observation comes in third, following a quiz about anxiety and medical history.
17) **17) Mehtap Muglali and Nurgul Komerik (2008)** carried out a study to determine the factors that could cause 120 patients who underwent minor oral surgery to become worried both before and after the procedure. They arrived at the conclusion that in order to reduce the patient's anxiety during minor oral surgery conducted under local anaesthesia, factors such jaw fatigue and fluid buildup in the mouth that were disregarded should be taken into account.

Postoperative swelling, trouble eating, and pain also need to be considered in order to lessen the patient's anxiety.

18) **S. Jaakkola, P. Rautava, P. Alanen, M. Aromaa et al (2009)** developed a new dental fear measurement, the Short Dental Fear Survey Question and tested for clinical practice.

19) **Hae-Ra Han in the year 2009** offered a thorough methodological analysis of the literature on how to quantify children's anxiety. While there are many ways to gauge one's anxiety level, choosing the right method should be an iterative process based on a careful analysis of the reliability data and cross-validation of the instrument among children of all ages.

20) In 164 patients undergoing oral surgery, **Manju A. Nair, Rajesh Shankarapillai, and Vijayalaxmi Chouhan in the year 2009)**assessed the prevalence of dental phobia. The findings showed that dental anxiety levels are equivalent to those in the literature.

21) "A prospective study on 145 patients who had their lower third molars extracted was conducted in 2009 by **Lucia Lago-Mendez, Marcio Diniz-Freitas, Carmen Senra-Rivera, Gloria Seoane-Pesqueira, and Jose Manuel Gandara-Rey**. The Corah Dental Anxiety Scale (DAS), Kleinkencht Dental Fear Survey (DFS), and State-Trait Anxiety Inventory were used to assess dental anxiety (STAI). They came to the conclusion that people who have high trait or dental anxiety may need longer surgeries and have worse post-operative recoveries".

22) **22) Jason Armfield (2010)** discussed the most popular self-report tools for measuring dental anxiety. Given that these scales serve to define the idea they are intended to assess by their very nature, this is of issue.

23) **F. Gulnot Jimeno, S. Yuste Blesla, C. Curadros Fernandez et al in the year 2011** given objective and subjective measures for assessing anxiety in paediatric patients. He also concluded that the level of cooperation will also improve when anxiety levels are low. Ioana Marginean, Letitia Filimon (2011)[20] validated study of Dental Fear Survey (DFS) on 198 participants on Romanian population. DFS is a psychometrical instrument frequently used for measurement of fear associated with situations and stimuli of dental treatment. Because dental fear and anxiety are present with all social categories and with all ages, measurement with validated instruments is essential for establishing of the treatment programme adapted to the patient's need and problems.

24) **Ad de Jongh, Arjen J. Van Wilk, and Jerome A. Lindeboom in the year 2011**)investigated the psychological effects of surgically extracting a third molar in 71 patients in order to discover potential psychological potential risks for the emergence of dental anxiety and symptoms of psychological trauma. Results showed that the effects of surgically extracting the third molar under local anaesthesia on the onset of dental anxiety or signs of psychological trauma were negligible.

25) In a group of 150 adults, **Ekta A. Malvania and Ajithkrishnan CG in the year 2011** examined the prevalence and sociodemographic correlates of dental anxiety. Results showed that 46% of respondents have dental phobia. Subjects in villages reported higher levels of anxiety than those in cities, and women were much more nervous than men. Subjects having a history of bad dental

experiences were much more anxious. They suggested that this topic be given attention and dealt with in a useful and meaningful way.

26) **Hina Hakim, Ishak Bin Abdul Razak, in the year 2012** used the Klienknechts DFS questionnaire to measure the prevalence and severity of dental anxiety among undergraduates studying health-related fields and to pinpoint the root causes of dental anxiety. According to the findings, dental students expressed dental fear more frequently (96%). The two things that caused the most terror were the drill and the anaesthetic needle. The two most common physiological signs were a quicker heartbeat and tense muscles. They came to the conclusion that dental fear and anxiety are widespread issues among undergraduates in both medicine and dentistry. Additionally, a high anxiety level makes people put off getting dental work done.

27) **Porritt J, Buchanan H, Hall M, Ghilchrist F, Marashman Z in the year 2012** used self-report measures to evaluate children's dental anxiety. They came to the conclusion that children's dental anxiety and fear-related behaviours pose difficulties for clinicians and dental public health practitioners. A. A

28) **Namankany, M.de Souza, and P. Ashley in the year 2012** analysed paediatric dental anxiety measures and evaluated the clinical relevance of the statistical techniques employed for validation. They came to the conclusion that there is currently no gold standard scale and that a scale with a cognitive component for children and adolescents has to be further developed.

29) In a sample of 60 participants, **Jean Carlos Fernandes Goulart, Matheus Dias Pinheiro, Rodrigo Ventura Rodrigues et al in the year 2012** examined the impact of dental anxiety on blood pressure and heart rate during dental procedures. They came to the conclusion that there was no change in the

behaviour of systolic and diastolic blood pressure in connection to the prospective anxiety level or pain throughout dental treatment.

30) **Paul Brady, Chris Dickinson, Helen Whelton in the year 2012** sought to identify and quantify characteristics in the dental office setting and nervous dental patients that may affect anxiety. The number of respondents who reported feeling nervous when their appointments were delayed was substantial. Many people have preferences about dentists and the setting of the office, which may act as fear modulators. JM Armfield and LJ Heaton (2013)[25] evaluated a number of non-pharmacological methods for treating dental anxiety and dread. The use of systematic desensitisation and hypnosis are also forms of management, as are effective communication and building rapport.

31) **Maria Carrillo-Diaz, Antonio Crego, and Martin Romero-Moroto in the year 2013** conducted research on how gender affects the link between dental anxiety and emotional wellbeing associated to oral health. They came to the conclusion that girls had higher levels of dental fear and anxiety which was linked to worse emotional wellbeing levels connected to oral health.

32) **Bernson JM, Elfstrom ML, and Hakeberg.M in the year 2013** controlled for socio-demographic characteristics and looked at dental coping mechanisms, general anxiety, and depression in connection to frequency of dental treatment in 263 individuals with either regular dental care or phobic avoidance. Results revealed that 141 patients who were undergoing dental care felt apprehensive. Dental, general, and depressive symptoms were all significantly greater. According to this study, people who experience high levels of general anxiety are more likely to have irregular dental treatment.

33) **In their 2013 study of 89 patients, Sungtae Kim, Yoon-jin Lee, Sojin Lee, Hong-Seok Moon, and MoonKyu Chung** evaluated subjective factors impacting pain perception, including anxiety from overall dental treatment and anxiety in relation to the time until implant surgery. Age, sex, and the quantity and location of implants were the objective criteria. They came to the conclusion that the Dental Anxiety Score and State of Anxiety Scores of a patient had an impact on pain severity. Complicated aspects like behavioral, psychological, and environmental issues are blamed for dental treatment anxiety. The likelihood of experiencing pain during the surgery is the main source of concern.

34) An introduction essay **by Carlson SG, Wide Boman U, Lundgren J, and Hakeberg M in the year 2013)**tries to describe the evolution of dental anxiety research and therapeutic activity. They discussed strategy, the development of treatments, etiological problems, as well as present and upcoming challenges. They said that there is still much to learn about dental anxiety research.

35) Anxious patients need medication to control their anxiety, according to **Crispian Scully and Roderick A. Cawson's in the year 2013** description of the anxiety caused by dental appointments. Acute and long-term impacts of stress were also discussed. They discussed the clinical characteristics, diagnosis, and general management of stress and anxiety, as well as dental aspects.

36) **Sandhya YK, Sandhya S, Jalihal S, et al. in the year 2013** evaluated electrocardiogram, ventilator, and hemodynamic changes during extraction operation in 60 individuals and compared changes with anxiety, fear, and pain. The patients in this study ranged in age from 12 to 15 years old. They came to the conclusion that during the procedure, hemodynamic, electrocardiograph, and ventilator parameters are affected by fear, anxiety, and pain.

37) **Jigar M. Dhuvad, Rajesh A. Kshisagar, and Mukesh M. Dhuvud in the year 2014** evaluated vital signs, the operator's comfort, and patient satisfaction during the extraction of the third molar under local anaesthesia, with or without sedatives. The surgical removal of an impacted third molar caused a decrease in intra-operative plasma oxygen saturation, according to the findings. After administering local anaesthesia for 10 minutes, the heart rate and blood pressure increased.

38) The Dental Fear Survey (DFS), which was validated in the year 2014 **by Cristiane Baccin Bendo, Miriam Pimenta Vale, and Antonio Oliveria, is trustworthy.** They conducted a prospective cohort study on 102 patients receiving local anaesthesia to determine other surgical difficulty predictors and determine whether patient anxiety affects the difficulty of an impacted lower third molar. They discovered a statistically significant relationship between the length of the procedure and the following factors: the depth of impaction, third molar angulation, radiological evidence of close proximity between the third molar roots and mandibular canal, coverage of the hard and soft tissues, and the requirement for ostectomy and tooth sectioning. Patients who needed tooth sectioning, had significantly impacted third molars, or had a history of infections were more fearful. There were no discernible differences between the sexes that were pertinent. In conclusion, impacted lower third molar extractions are much more challenging in worried patients and that higher anxiety levels are significantly connected with longer operation times.

39) **Pia Lopez-Jornet, Fabio Camacho-Alonso, and Mariano Sanchez-Siles in the year 2014** examined how much fear and anxiety 70 patients receiving local anaesthesia experienced before to, shortly following, and one week after dental

extraction. Spielberger's State Trait Anxiety Inventory (STAI), the Modified Corah Dental Anxiety Scale (MDAS), and the Dental Fear Survey were used to gauge each patient's level of anxiety (DFS). Significant variations were found in the MADS between before and immediately after extraction, immediately after and 7 days after extraction, and the STAI Trait scale between before and 7 days after extraction. The DFS varied before and after extraction as well as immediately and seven days after extraction. They also came to the conclusion that although dental anxiety may be affected by surgical approaches immediately following tooth extraction, this influence is not present seven days later.

40) In 71 paediatric patients**, Juan Nuinelo-Lorenzo, Jose Otero Sanfeliu, Santiago Vivas Alegre, et al. in the year 2014** studied the hemodynamic changes that occurred during dental examinations and 30 preventive treatments in order to establish the relationship between psychometric tests and haemodynamic parameters. They came to the conclusion that patients who visited for dental checkups and preventive treatments saw significant changes in heart rate and blood pressure**.**

41) In a study of 117 patients, **Urszula Kanaffa Kilijanska, Urszula Kaczmarek, Barbara Kilijanska, and Dorota Frydecka in the year 2014** evaluated the subjects' oral health status and hygiene practises in relation to their level of dental anxiety. They came to the conclusion that dental anxiety has a detrimental impact on oral health..

42) Patients who needed dental care at dental clinics or hospitals were surveyed regarding their levels of dental anxiety by **Vedati Prathima, M. Shakeel Anjum, P. Parthasarathi Reddy, et al. in in the year 2014.** They discovered that people who need to have their teeth extracted have higher anxiety levels

than those who need to get dentures. Patients who have greater dental anxiety should receive additional attention from the dentists.

43) **Shalender Sharma, Kaberi Majumder, J.K. Dayashankara Rao, et al. in the year 2015** sought to assess the numerous factors that can exacerbate anxiety in patients after tooth extraction and its relationship with pain perception in 100 patients. Using the Visual Analog Scale, pain and anxiety were examined (VAS). Results indicated that the intensity of pain and anxiety varied significantly by gender. Women were more fearful than males because they anticipated suffering.

44) **In a study conducted by Devapriya Appakuttam, Sangeetha Subramanian, Anupama Tadepalli, and Lokeshkumar in the year 2015,** 1148 patients between the ages of 18 and 70 had their dental anxiety, factors that affect dental anxiety, and anxiety related to tooth extraction procedures assessed. Results showed that 45.2% of participants had lower levels of anxiety, 51.8% had moderate to high levels of anxiety, and 3% had dental phobia. Participants who had a bad dental experience and younger female subjects exhibited greater anxiety. Notably, 82.6% expressed anxiety over the extraction process. They came to the conclusion that a sizeable portion of the population experiences dental anxiety. Dental anxiety is influenced by things including age, gender, education, career, financial security, and unpleasant dental experiences in the past. Anxiety increased after the extraction, tooth drilling, and local anaesthetic injection.

MATERIALS AND METHODS

Study Design: Randomized Controlled Clinical Trial.

Source of data: The study was conducted in the "Department of Oral and Maxillofacial Surgery, KAHER's KLE VK Institute of Dental Sciences, Belagavi with due permission of the institutional ethical committee". The procedure will be explained to all the patients and an informed consent will be signed by them.

Eligibility Criteria:

Inclusion criteria:

1) Patients between 18 to 45 years with impacted third molars advised for extraction.
2) Patients willing to give informed consent.

Exclusion criteria:

1) Mentally challenged patients or patients with Learning disability.
2) Patients with impaired hearing.
3) Patients on anti-depressants and anti-anxiety drugs.
4) Pregnant or lactating women.
5) Patient not willing to participate in study.

Sample size estimation: The sample size was calculated from the following formula below:

$$n = \frac{2S^2(Z_\alpha+Z_\beta)^2}{d^2}$$

Z_α= 1.96 at 5% alpha-error

Z_β= 1.68 at 5% beta-error

$d = 2.154$ ie. $(Z_{\alpha} + Z_{\beta})^2$

$S = (S_1 + S_2)^2 / 2$

$S_1 = 3.24$; $S_2 = 3.11$

$n = 56$

Minimum number of patients at 95% power is 56.

Procedure

1) To take part in this trial, 120 individuals will be enrolled in surgery to remove their impacted third molars.
2) The Randomization method will be used to divide participants into two groups: control group A (60 individuals) and music-treated group B (60 subjects).
3) The demographic information of the patient will be gathered during a preoperative meeting, and a preoperative questionnaire will be administered to measure the preoperative anxiety scale for both groups.
4) From the time the music-treated group enters the operating room until the procedure is complete, their chosen music will be played.
5) Dental Anxiety Scale will be used to assess the Preoperative anxiety. Throughout the procedure, the patient's vital signs (blood pressure, heart rate, and breathing rate) will be watched.
6) The Dental Anxiety Scale will also be used to measure preoperative and postoperative anxiety.
7) Post-operative, Intra-operative & Post-operative questionnaire will be provided to assess the efficacy of music therapy for both the groups.

The following parameters were used

1) **Pre-operative assessment**

A detailed case history, routine blood investigations, radiographic investigations and anxiety level calculation with the Modified Dental Anxiety Scale will be done for all the patients of both the groups.

"The Modified Dental Anxiety Scale". Each item is scored as follows:

Not anxious	=	1
Slightly anxious	=	2
Fairly anxious	=	3
Very anxious	=	4
Extremely anxious	=	5

Total score is a sum of all five items, ranges from a cumulative value of 5 to 25: Cut off which is tallied at 19 or above indicates a highly dentally anxious patient, possibly dentally phobic

Following investigations were carried out

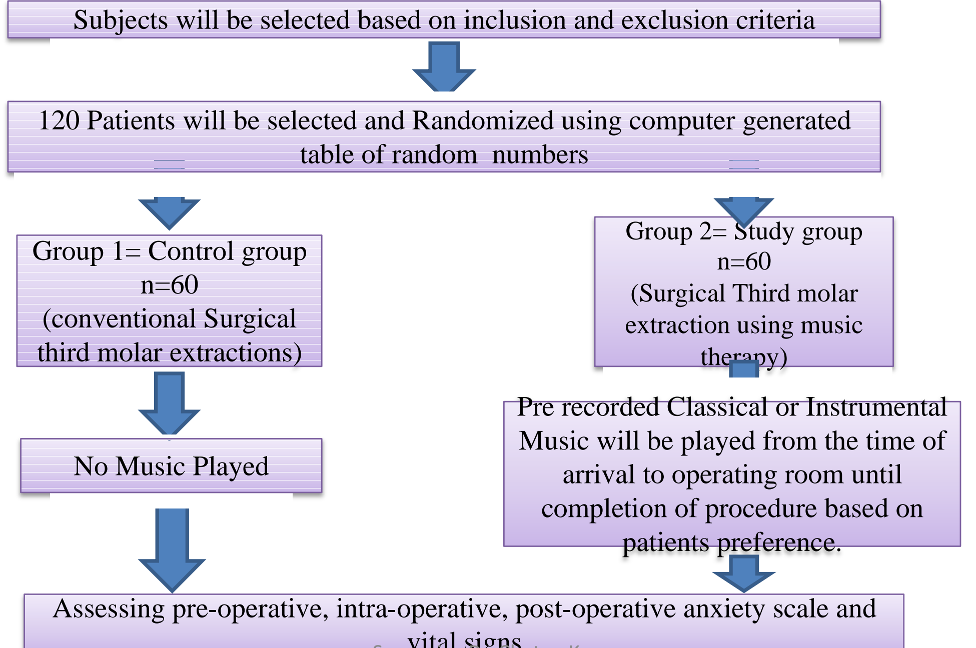
1) Random blood sugar level
2) Haemoglobin level
3) Bleeding time
4) Clotting time
5) X-rays- IOPAR

Statistical analysis

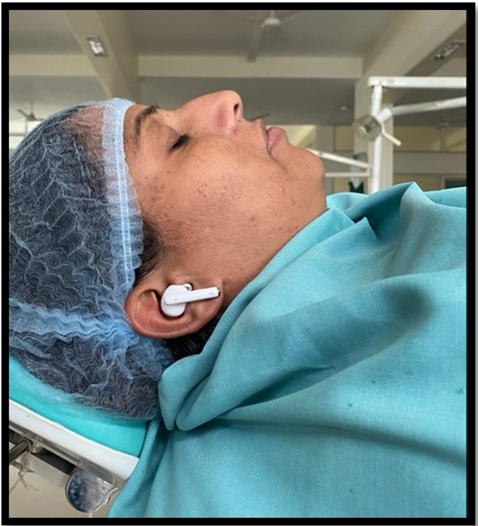
Following statistical analysis was carried out

1) Data obtained will be entered in excel sheet and subjected to statistical analysis.
2) Descriptive Statistics (Mean and Standard Deviation) will be calculated.
3) Chi-Square Test and ANOVA (Analysis Of Covariance) OR Independent t-test and Dependent t-test analysis using SPSS version 21, IBM Statistics, USA.
4) Statistical significance to be accepted at a confidence level greater than 95% ($p < 0.05$).

METHODOLOGY



Synopsis - Dr Chetan K.

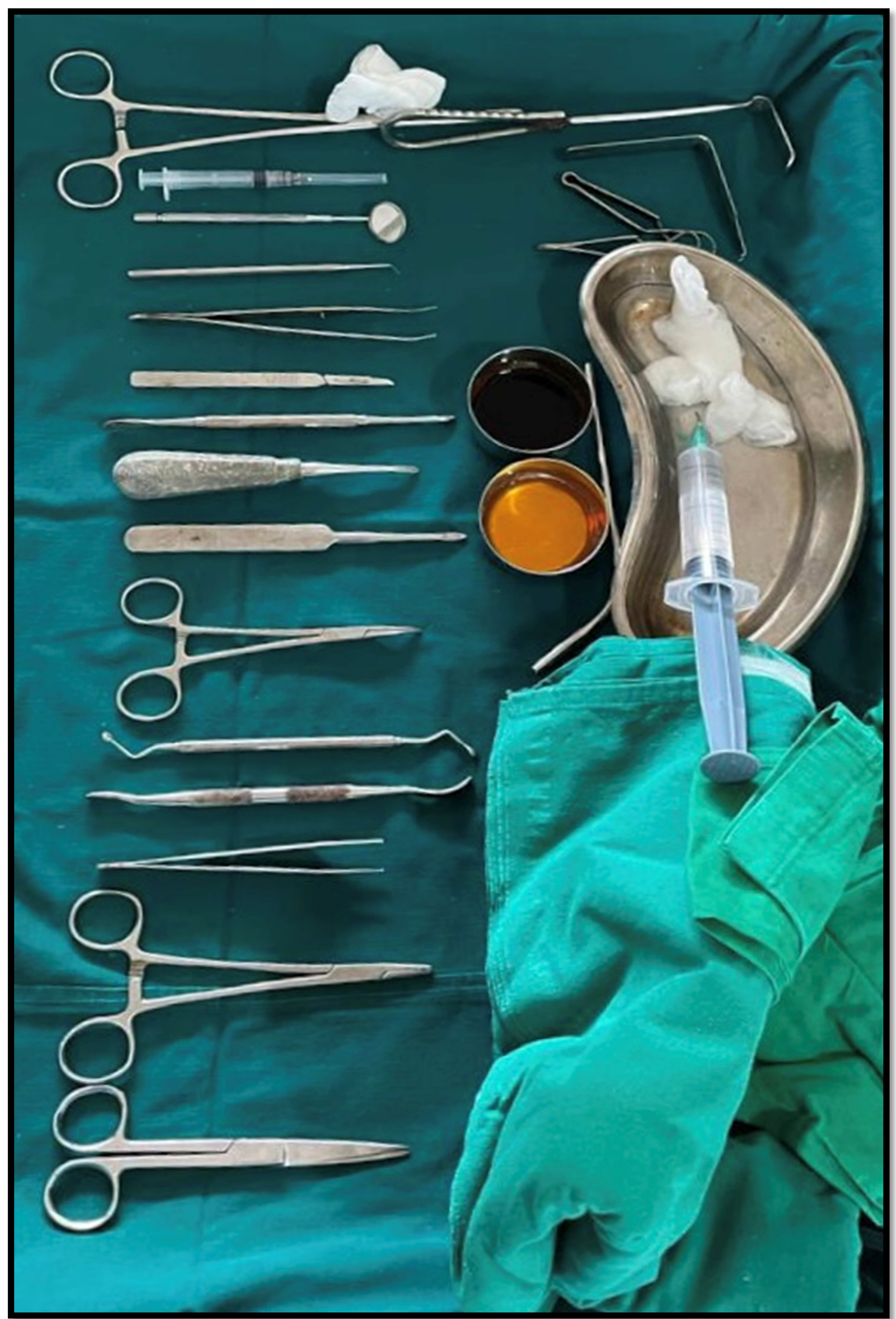


Picture 1: Patients getting treated with Music

Picture 2: Omron Blood Pressure Monitor

Picture 3: Boat Bluetooth Earphones

Picture 4 Pulse Oximeter



Picture 5 Surgical Tray for Impacted Third Molar surgery

RESULTS

Test for Data Normality:

The normality was checked using Shapiro-Wilk test and the data was found to be normally distributed. ($p>0.05$)

Table 1. Distribution of study population by control and music group

GROUP	**Control**		**Music**	
Age (years)	60	29.18 ± 7.71	60	30.50 ± 8.67
	n	%	n	%
Total	60	100.0	60	100.0
Sex				
Male	26	43.3	24	40.0
Female	34	56.7	36	60.0
Surgical Procedure				
38	34	56.7	34	56.7
48	26	43.3	26	43.3
PRE Any surgical Procedure Before? If Yes, Score?				
No	11	18.3	12	20.0
1	2	3.3	4	6.7
2	39	65.0	32	53.3
3	6	10.0	7	11.7
4	2	3.3	5	8.3
POST Prefer music (Yes/No) to reduce anxiety				
No	56	93.3	60	100.0
Yes	4	6.7	0	0.0

Table 1. summarises the distribution of study population in terms of gender surgical procedure (tooth number) and questions related to any other previous history of surgery and preference of music to reduce anxiety level.

Table 2. Comparison of dental anxiety scores between control and music groups.

GROUP		Mean	SD	t-value	p-value
Score After Briefing the patient about the procedure.	Control	2.10	0.63	7.523	<0.001*
	Music	1.32	0.50		
Score during LA	Control	2.30	0.59	8.439	<0.001*
	Music	1.43	0.53		
Score During incision and flap reflection	Control	2.30	0.59	8.439	<0.001*
	Music	1.43	0.53		
Score during Bone Guttering	Control	2.28	0.56	8.200	<0.001*
	Music	1.47	0.54		
Score during Sectioning and Elevation of tooth	Control	2.38	0.61	8.306	<0.001*
	Music	1.47	0.60		
Score during Suturing	Control	2.18	0.47	7.608	<0.001*
	Music	1.48	0.54		
Score Throughout the procedure	Control	2.08	0.53	7.304	<0.001*
	Music	1.40	0.49		
Score if you have to undergo another Surgical procedure	Control	2.20	0.66	7.526	<0.001*
	Music	1.40	0.49		

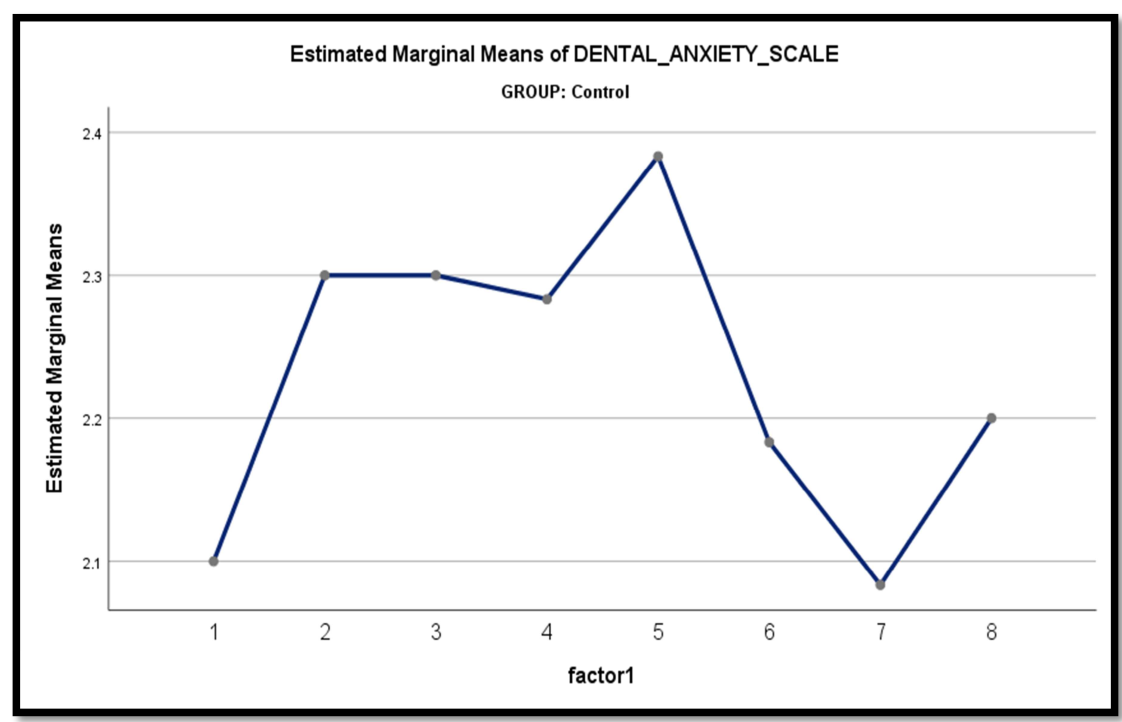
Table 2 summarises the dental anxiety scale between control and music groups which reveals that music group (1.32 to 1.47) has lesser dental anxiety score in comparison to the control group (2.08-2.30). **Independent t-test** revealed that there was statistical significant difference found between the control and the test group with the p-value less than 0.001.

Table 3. Comparison of dental anxiety scores in terms of various pre, intra, and post operative surgical steps amongst control and music groups.

GROUP		n	Mean	SD	F-value	p-value
Control	Score After Briefing the patient about the procedure.	60	2.10	0.63	4.635	0.001*
	Score during LA	60	2.30	0.59		
	Score During incision and flap reflection	60	2.30	0.59		
	Score during Bone Guttering	60	2.28	0.56		
	Score during Sectioning and Elevation of tooth	60	2.38	0.61		
	Score during Suturing	60	2.18	0.47		
	Score Throughout the procedure	60	2.08	0.53		
	Score if you have to undergo another Surgical procedure	60	2.20	0.66		
Music	Score After Briefing the patient about the procedure.	60	1.32	0.50	1.874	0.114
	Score during LA	60	1.43	0.53		
	Score During incision and flap reflection	60	1.43	0.53		
	Score during Bone Guttering	60	1.47	0.54		
	Score during Sectioning and Elevation of tooth	60	1.47	0.60		
	Score during Suturing	60	1.48	0.54		
	Score Throughout the procedure	60	1.40	0.49		
	Score if you have to undergo another Surgical procedure	60	1.40	0.49		

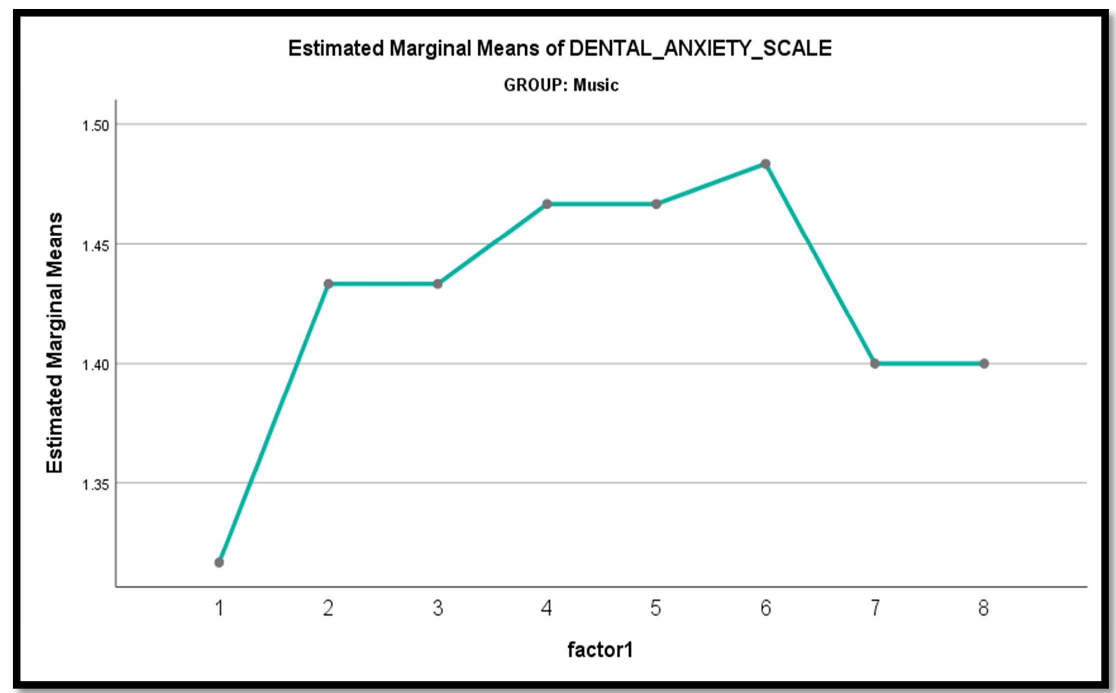
There was statistically significant difference in the dental anxiety scores amongst various pre, intra and post-surgical steps in the control group (2.23 ± 0.58). However, there was no statistical significant difference found in the music group (1.43 ± 0.53).

Figure 1. Comparison of dental anxiety scores in terms of various pre, intra, and post operative surgical steps in the control group.



Factor 1: Score After Briefing the patient about the procedure; Factor 2: Score during LA ; Factor 3: Score During incision and flap reflection ; Factor 4: Score during Bone Guttering ; Factor 5: Score during Sectioning and Elevation of tooth ; Factor 6: Score during Suturing ; Factor 7: Score Throughout the procedure ; Factor 8: Score if you have to undergo another Surgical procedure

Figure 2. Comparison of dental anxiety scores in terms of various pre, intra, and post operative surgical steps in the music group



Factor 1: Score After Briefing the patient about the procedure; Factor 2: Score during LA ; Factor 3: Score During incision and flap reflection ; Factor 4: Score during Bone Guttering ; Factor 5: Score during Sectioning and Elevation of tooth ; Factor 6: Score during Suturing ; Factor 7: Score Throughout the procedure ; Factor 8: Score if you have to undergo another Surgical procedure

Table 4. Comparison of vital signs among study population between control and music groups

GROUP		Mean	SD	t-value	p-value
PRE Blood Pressure Systole	Control	120.77	7.26	-1.104	0.272
	Music	122.40	8.87		
PRE Blood Pressure Diastole	Control	83.73	6.45	0.116	0.908
	Music	83.60	6.12		
PRE Pulse rate	Control	77.77	7.08	-1.084	0.281
	Music	79.35	8.83		
POST Pulse rate	Control	78.62	7.45	0.691	0.491
	Music	77.65	7.88		
POST Blood Pressure Systole	Control	122.33	6.81	1.085	0.280
	Music	120.80	8.57		
POST Blood Pressure Diastole	Control	84.27	5.79	0.957	0.340
	Music	83.20	6.40		

Table 4 shows the vital signs among these study population between the control and the music group. There was no statistically significant difference in the vital signs between the test and control groups ($p > 0.05$) which reveals that both control and music groups were equally effective in decreasing dental anxiety.

Table 5. Groupwise comparison of pre and post vital signs among study population

GROUP		n	Mean	SD	t-value	p-value
Control	PRE Blood Pressure Systole	60	120.77	7.26	-3.453	0.001*
	POST Blood Pressure Systole	60	122.33	6.81		
	PRE Blood Pressure Diastole	60	83.73	6.45	-0.970	0.336
	POST Blood Pressure Diastole	60	84.27	5.79		
	PRE Pulse rate	60	77.77	7.08	-2.829	0.006*
	POST Pulse rate	60	78.62	7.45		
Music	PRE Blood Pressure Systole	60	122.40	8.87	3.972	<0.001*
	POST Blood Pressure Systole	60	120.80	8.57		
	PRE Blood Pressure Diastole	60	83.60	6.12	1.169	0.247
	POST Blood Pressure Diastole	60	83.20	6.40		
	PRE Pulse rate	60	79.35	8.83	5.226	<0.001*
	POST Pulse rate	60	77.65	7.88		

Table 5 presents the groupwise comparison of pre and post vital signs among study population. There was a statistically significant decrease in systolic blood pressure (122.4 to 120.8 mm/Hg) and pulse rate (79.35-77.65bpm) in the music group after intervention (p <0.001), whereas there was a statistically significant increase in the systolic blood pressure (120.77-122.33) and pulse rate (77.77-78.62) in the control group after the surgical procedures without the music therapy (p <0.001).

On the other hand, there was a no statistically significant difference found in the diastolic blood pressure in both control and music group (p > 0.05),

DISCUSSION

The effects of music on the extraction of the impacted mandibular third molar were objectively assessed and analysed by the study's authors. Research on ANS activity during tooth extraction has been conducted in the past, but they were not standardized according to the type of extracted tooth and the surgeon's level of expertise. The 3rd molar in the mandible was the focus of the current study. The authors predicted that the stress level of the patient undergoing treatment would differ depending on the level of experience of the surgeon.

The authors of this study were able to standardise both the operating room and the tooth extraction procedure because the same surgeon performed every extraction.

The studies that recorded HRV while administering local anaesthesia employed a local anaesthetic and epinephrine. Epinephrine, however, has an impact on HRV and circulation. As a result, local anaesthetic was employed instead of a catecholamine.

According to prior reports,

Music was chosen on 2 criteria's:

1) Sympathetic nervous system is not activated by the tempo of the music
2) Classical music promotes relaxation.

A music pace of 60 beats per minute is said to have no effect on Heart Rate, LF/HF, or the HF component (bpm). [19] Additionally, it was shown that listening to music with a tempo of at least 100 bpm led to a notable rise in the LF/HF.

Sympathetic nervous system stimulation and effects on HR were not predicted because the study's music rate was similar to roughly 58 bpm.

Additionally, classical music has been proven to significantly reduce patient anxiety during dental procedures and is frequently utilised in dentistry to relax patients[8,11]. It is theorized that classical music has an influence on physiologic and psychological reactions.[2]

In the music group, the LF/HF (Low frequency/High frequency Heart Rate) was noticeably reduced during the procedures of flap reflection, bone removal, and dental crown separation. "When compared to the resting condition, the control group's LF/HF increased during the procedure from the administration of local anaesthetic to tooth extraction."

Music did not reduce LF/HF while the tooth was being extracted or local anaesthetic was being administered. Iatrogenic noise is produced during dental procedures because high-speed rotating devices are required to remove bone and separate the tooth crown. The authors advise using headphones to listen to classical music to lessen sympathetic nerve activation brought on by dental procedure sounds. Listening to music, for instance, at the incision and flap reflection, reduced LF/HF, with the exception of when local anaesthesia was being used and when the mandibular third molar was being extracted.

The authors contend that even during silent treatments, listening to music can be helpful in some ways. Because dental procedures are carried out in a noisy atmosphere, it is thought to be beneficial to listen to music during them. However, this practise may also be beneficial during some procedures that do not take place in a

noisy environment. The results of this study demonstrated the value of music during procedures such as bone removal, dental crown separation, flap reflection, and extraction of impacted mandibular 3rd molars because it reduces sympathetic activity.

Sympathetic nerves are found throughout the myocardium in addition to the sinus node; they alter the dynamics of the circulatory system by increasing cardiac output and myocardial contractile force. Since the relationship between cardiac output and peripheral vascular resistance determines blood pressure, the two variables are not always connected. Similar to prior observations, the degree of internal stress experienced by a patient may be indicative of cardiac sympathetic nerve activity rather than only blood pressure or heart rate.

The current findings imply that playing music during therapy reduces internal stress. Additionally, the STAI-S score drop for the music group was significantly higher than it was for the control group (P =.047). Soothing music may be very helpful in lowering the patient's anxiety levels when the impacted third molar tooth is being extracted from the jaw.

The purpose of the current study was to determine whether musical intervention may be used as a potential anxiolytic therapy during impacted mandibular 3rd molars surgery. We investigated the effects of musical intervention on the perioperative anxiety, pain perception, and vital signs of patients undergoing surgery on their impacted third molars.

“In order to determine whether vital signs, perioperative anxiety, and pain perceptions could be positively influenced while an Impacted 3rd molar was being

surgically removed," the primary objective of this study was to determine whether musical intervention could affect patients undergoing Impacted 3rd molar surgery's perioperative psychosomatic states.

In comparison to the control group, the music intervention group's changes in HR were noticeably less pronounced. The music intervention did not significantly change SBP or DBP, though. Additionally, the music-treated group's RR change was higher than that of the control groups.

As a result, the first hypothesis that a musical intervention during an IMTM procedure will cause minor changes in the patients' vital signs—was only partially proven correct. The capacity to support this idea does, however, have significant limits that should be addressed. To begin with, a number of studies have did not found "association between musical interventions and vital signs during local anaesthetic surgery."[17,25,26] Changes in vital signs can also be brought on by non-specific physiological reactions, such as bradycardia brought on by local anaesthetics or sedation brought on by blocking sympathetic processes. The effect of music therapy on vital signs in these circumstances may be minimal, if any.

"Despite the fact that HR and RR were found to be significantly different between the 2 groups in the current study, changes in vital signs throughout the surgical stages were within normal ranges for both groups; it is challenging to extrapolate these results to groups with clinically significant changes in physiologic functioning. However, this study, along with a number of others, demonstrated that patients' vital signs alter depending on the precise stage of the surgical process. The current investigation confirmed Nichol's observation that blood pressure readings

were typically greater at the beginning of a surgical procedure than they were at the conclusion”.[27]

According to reports, specific surgical discomfort or noise, such as during osteotomy or tooth sectioning, is what causes changes in vital signs connected to third molar extraction.[28-30] Additionally, this study also shows vital signs drastically alter depending on the surgical phase. However, it's interesting to note that in this study, all vital indicators peaked at the beginning of the procedure—during the anaesthetic solution injection and the first incision—and then abruptly dropped off after that.

Clinically speaking, these findings imply that clinicians should start showing concern and providing care even before major surgical operations like osteotomy or odontotomy. There are a few potential contributing elements to these events. “The first possibility is the increase in BP, HR, and RR might be directly caused by the anaesthetic solution, which contains a vasoconstrictor, even though some studies looking at the hemodynamic effects of local anaesthetics with epinephrine have reported no significant changes in HR or BP across the stages of surgery. [31-33] Endogenous adrenalin release brought on by pain reflex to an anaesthetic injection may be the cause of the variations in vital signs between surgical stages.”

Although topical anaesthetic cream was used to lessen the impact of injection pain, it was undoubtedly feasible for a patient to experience intense pain as a result of both the injection and a lower pain threshold brought on by worry and panic. Specifically, at this point in the surgery, it is necessary to cause considerable fluctuations in the patient's vital signs in order to increase preoperative anxiety. “Finally, the homogeneity test in this study may have reduced the likelihood that changes in vital signs were driven by specific demographic characteristics, such as

age, gender, and prior dental experience. Anxiety about dental procedures is a widespread issue that prevents people of all ages from receiving the dental care they need. [21,35] Additionally, many people have unique and strong phobias related to having surgery for disorders of the mouth and face."[11,36,37]

"Patients regard IMTM surgery as a very severe kind of therapy with a high likelihood of anaesthesia, bleeding, postoperative problems, and protracted postoperative recovery times, in contrast to other areas of dentistry". There is a clear link between surgery patients' perioperative anxiety levels and their perceptions of pain, according to a number of research. There is a link between high preoperative anxiety levels and high post-operative pain perceptions, and increasing preoperative anxiety is linked to increased intraoperative anaesthetic needs. [7-9], This study shows that" preoperative anxiety levels were a strong predictor of intraoperative anxiety levels and intra-operative pain perceptions, highlighting the need of reducing preoperative anxiety in patients undergoing IMTM surgery."

Undergoing analyses of covariance that took preoperative anxiety levels into account as the covariance partially confirmed the second hypothesis of this study, "Musical intervention will lessen perioperative anxiety levels and perceptions of pain in patients following IMTM surgery."

While the untreated control group had a rise in anxiety throughout the procedure, the music-treated group clearly displayed a significant decrease in intraoperative anxiety. This outcome is consistent with earlier research showing that listening to music during surgery reduces intraoperative anxiety in patients who have undergone local anaesthesia. [17,38] The findings of this study, however, also imply that musical intervention had no impact on perioperative pain ratings.

Given the modest levels of pain perception experienced by both groups throughout the IMTM procedure, perioperative anxiety may only slightly alter a patient's pain threshold during IMTM. Clinicians may be better able to provide their patients with the best care if they are aware of certain circumstances that can raise their anxiety levels. Although sedation is a common component of anxiolytic treatments, there is debate over whether it is always the best course of action because some findings suggest that sedation does not always reduce patients' anxiety before the procedure.[39,40]

According to Johren et al., "those who are sedated also miss out on the opportunity to develop effective stress management techniques. In order to assess anxiety management in patients undergoing IMTM surgery, it is critical to analyse perioperative anxiety levels and alternative anxiolytic approaches, such as musical treatments."

"Despite the fact that this study shown that music therapy is a straightforward, non-intrusive, and effective anxiolytic approach, there are a number of factors to take into account before using it during IMTM surgery. Particularly, the direct effects of music therapy on patients' vital signs, their degree of anxiety during surgery, and their perceptions of pain afterwards were somewhat less significant than expected."[41]

The reason for this might be because the patients who underwent IMTM surgery had abnormally high preoperative anxiety levels, which prevented the music intervention from having its full intraoperative anxiolytic benefits. In contrast to regular dentistry patients, whose average Dental Anxiety Scale scores have been reported to range from 7.3 to 8.7,[42–44] individuals receiving IMTM surgery typically have much greater perioperative anxiety levels, as this study has demonstrated.

The fact that music therapy is less effective during IMTM than it is during other surgical or dental procedures may be the cause of the severe emotional distress that patients who are having IMTM surgery experience beforehand.

The musical intervention in the current investigation started as soon as the patients entered the surgery room. As a result, it is advised that such musical interventions start prior to the primary surgical procedure in order to reduce emotional stress and preoperative anxiety. To enhance the anxiety-reducing effects of music therapies, numerous researchers have advised clinicians to take into account patients' musical tastes and familiarity with the music they have chosen.[14,18,38]

In the current investigation, patients' musical tastes were quickly polled during a preoperative meeting utilising a list of musical genres. In order to reduce discomfort and weariness throughout the intervention, Snyder and Lindquist19 advised that patients pick the right music volume.

In this trial, patients could independently adjust the volume using a headset that had an extra volume control button. External speakers should be avoided in favour of volume-controllable headsets to prevent surgical staff members from being distracted during operation. It is advised that a larger-scale study be conducted in the future to determine the clinical value of music therapy. It is crucial to assess the impact of music therapy on vital signs and perioperative anxiety specifically in light of the patient's trait anxiety when undergoing IMTM surgery.

This research had several restrictions. There was a smaller sample size used. Furthermore, the treatment was restricted to removing the impacted third molar on the

mandible. To assess the mechanisms at play and the approaches to halt the emergence of systemic occurrences, more research is necessary.

According to the current analysis, LF/HF can indicate internal tensions that were present during the extraction of the impacted mandibular third tooth. The pre-treatment MDAS score was able to predict the state of the sympathetic nervous system before the surgery.

Listening to music while having the impacted mandibular 3rd molar extracted lowers sympathetic nerve activity and soothes anxiety throughout the incision and flap reflection, bone removal, and separation of the tooth crown.

CONCLUSION

The effectiveness of music therapy for lowering anxiety levels in patients having surgical extraction of an impacted third molar under local anaesthesia was evaluated in the current randomised controlled trial and it can be concluded that "music-treated group definitely showed a significant decrease in intraoperative pain and anxiety levels, whereas the untreated control group showed an increase in anxiety levels during the procedure."

Not only do musical treatments influence physiologic patient functioning variables like blood pressure, heart rate, and respiration rate, but they also influence emotional variables like perioperative anxiety and pain thresholds. The effects of music therapy on the ANS and psychological state during and after extraction of the impacted mandibular third molar were demonstrated by the study The Effects of Music Listening During Extraction of the Impacted Mandibular Third Molar on the Autonomic Nervous System and Psychological State. This is because music therapy decreases sympathetic nerve activity during flap reflection, bone removal, and crown separation.

However, further research with larger sample size can be undertaken to validate the findings of our study and explore the mechanisms involved in use of Music Therapy for relaxation and stress management.

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ANNEXURES - I
ETHICAL CLEARANCE

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CERTIFICATE

This is to Certify that the synopsis titled Assesment of the effect of music therapy for reduction of anxiety levels in patients undergoing surgical extraction of impacted third molars under local anaesthesia - A Randomised Controlled Trial *Submitted by*

Dr. ______________ *P. G. Student / Staff, Guided by* ______ *from Department of* Oral And Maxillofacial Surgery *has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study*

Date : 5/5/21

Member Secretary
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

Chairman
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

ANNEXURES - II

BIOSTATISTICS CLEARANCE CERTIFICATE

KLE V.K. Institute of Dental Sciences

(A Constituent unit of KLE Academy of Higher Education & Research
Deemed-to-be-University u/s 3 of the UGC Act, 1956)
Nehru Nagar, Belagavi-590 010 INDIA

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Biostatistics Clearance Certificate

This is to certify that the Biostatistics aspect of the Dissertation / Research work of **Post Graduate Student**, under the guidance of M.D.S, **Professor, Department of ORAL AND MAXILLOFACIAL SURGERY** entitled **"ASSESSMENT OF THE EFFECT OF MUSIC THERAPY FOR REDUCTION OF ANXIETY LEVELS IN PATIENTS UNDERGOING SURGICAL EXTRACTION OF IMPACTED THIRD MOLARS UNDER LOCAL ANAESTHESIA - A RANDOMIZED CONTROLLED TRIAL."** has been done under my guidance and considered satisfactory.

Name & Signature of Biostatistician
Dr. S.B. Javali
Sr. Asso. prof. in statistics
Dept. of com. medicine
USM KLE IMP, Belagavi.

Date:

Place: Belagavi

ANNEXURE-III
PLAGIARISM CHECK REPORT

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Date : 31.12.2022 Serial No. : 149

PLAGIARISM CHECK REPORT

Name of the Applicant :
UG / PG / Ph.D / Staff : POSTGRADUATE STUDENT
Batch & Year : 2020 – 23
Department : ORAL AND MAXILLOFACIAL SURGERY

The soft copy of Research Work / Manuscript by entitled "ASSESSMENT OF THE EFFECT OF MUSIC THERAPY FOR REDUCTION OF ANXIETY LEVELS IN PATIENTS UNDERGOING SURGICAL EXTRACTION OF IMPACTED THIRD MOLARS UNDER LOCAL ANAESTHESIA – A RANDOMISED CONTROLLED TRIAL" under the guidance of ……………has been submitted for Anti-Plagiarism check to the Scientific Correspondence & Review Committee of KLE VK Institute of Dental Sciences using "Turn-it-in" software.

The scan has been carried out and the scanned output reveals a Similarity Index of 9 %, which is **within / not within** the acceptable limits of 10% as per the UGC guidelines.

Member Secretary
Scientific Correspondence and Review Committee
KLEVK Institute of Dental Sciences
KAHER-Belagavi

Chairman
Scientific Correspondence and Review Committee
KLEVK Institute of Dental Sciences
KAHER - Belagavi

ANNEXURE – IV – CONSENT FORM

CONSENT FORM

“K.L.E.’s V.K. Institute of Dental Sciences”

Department of Oral and Maxillofacial Surgery, Belagavi

“Assessment of the effect of music therapy for reduction of anxiety levels in patients undergoing surgical extraction of impacted third molars under local anaesthesia - a randomized controlled trial”

I………………………………………………………… age ……….. have been explained the details of the study undertaken. I am fully satisfied with the procedure and instructions given by Dr. _______________ and hereby give my permission to participate in this study.

Place:

Date

ಒಪ್ಪಿಗೆ ಪತ್ರ

K.L.E.'s V.K. ಇನ್ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಡೆಂಟಲ್ ಸೈನ್ಸಸ್
ಬಾಯಿಯ ಮತ್ತು ಮ್ಯಾಕ್ಸಿಲೊಫೇಶಿಯಲ್ ಸರ್ಜರಿ ಇಲಾಖೆ, ಬೆಳಗವಿ

'ರೋಗಿಗಳನ್ನು ಕಡಿಮೆ ಮಾಡುವಲ್ಲಿ ಸಂಗೀತದ ಥೆರಪಿಯ ಪರಿಣಾಮವನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡಲು ಸ್ಥಳೀಯ ಅರಿವಳಿಕೆ ಅಡಿಯಲ್ಲಿ ಪರಿಣಾಮಕಾರಿಯಾದ ಮೂರನೇ ಮೋಲಾರ್‌ಗಳ ಸರ್ಜಿಕಲ್ ಎಕ್ಸ್‌ಟ್ರಾಕ್ಷನ್‌ನ ಅಡಿಯಲ್ಲಿ ಆತಂಕದ ಮಟ್ಟಗಳು - ಯಾದೃಚ್ ized ಿಕ ನಿಯಂತ್ರಿತ ಪ್ರಯೋಗ'.

ನಾನು ……………………………………………… ವಯಸ್ಸು ……… .. ಕೈಗೊಂಡ ಅಧ್ಯಯನದ ವಿವರಗಳನ್ನು ವಿವರಿಸಲಾಗಿದೆ. ಡಾ. ____________ ನೀಡಿದ ಕಾರ್ಯವಿಧಾನ ಮತ್ತು ಸೂಚನೆಗಳಿಂದ ನಾನು ಸಂಪೂರ್ಣವಾಗಿ ತೃಪ್ತಿ ಹೊಂದಿದ್ದೇನೆ ಮತ್ತು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನನ್ನ ಅನುಮತಿಯನ್ನು ನೀಡುತ್ತೇನೆ.

ಸ್ಥಳ:

ದಿನಾಂಕ:

ಭಾಗವಹಿಸುವವರ ಸಹಿ:

ಸಂಪರ್ಕ ಸಂಖ್ಯೆ.
ವಿಳಾಸ:

संमती पत्र

के.एल.ई. च्या व्ही.के. दंत विज्ञान संस्था
तोंडी आणि मॅक्सिलोफेसियल शस्त्रक्रिया विभाग, बेलगावी

'लोकल अनेस्थेसिया अंतर्गत एक तृतीय मालाच्या प्रभावशील' सर्जिकल एक्सट्रक्शन अंडरस्ट्रेटिंग पॅटंट्स ॲनेक्टिव्ह लेव्हल्स 'मधील संगीताच्या थेरपीच्या प्रभावीतेचे मूल्यांकन करण्यासाठी.

मी .... वय .... हाती घेतलेल्या अभ्यासाचा तपशील सांगितला आहे. डॉ. _________________ यांनी दिलेल्या कार्यपद्धती व सूचनांसह मी पूर्णपणे समाधानी आहे आणि याद्वारे या अभ्यासामध्ये भाग घेण्याची परवानगी देतो.

ठिकाण:

तारीख:

सहभागीची स्वाक्षरी:

संपर्क क्रमांक
पत्ता:

PREOPERATIVE ASSESSMENT

1. Name
2. Age
3. Sex
4. Have you undergone any surgical extraction procedure before ? Yes Or No. If yes , what was your experience?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

5. How would you rate your Anxiety level after knowing the surgical procedure of impacted third molar ?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

+Vital signs

INTRAOPERATIVE ASSESSMENT

1. When you were given Local Anaesthesia , how did you feel ?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

2. When the incision was placed and flap reflected, how did you feel?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

3. How did you feel when the bone was being drilled?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

4. How did you feel during sectioning/elevation of the impacted tooth ?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

5. How did you feel at the time of needle insertion and suturing?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

6. Do you prefer musical therapy as an alternative technique to reduce anxiety during the procedure?

yes ☐ *No* ☐

+ Vital signs

POSTOPERATIVE ASSESSMENT

1. How did you feel throughout the procedure ?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

2. If you have to get another teeth surgically extracted , how would you feel?

Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

3. Would you prefer musical therapy as an alternative technique to reduce anxiety?

yes ☐ *No* ☐

+ Vital Signs