

# The Influence of Relaxation Music Therapy with Binaural Beat Effect on Salivary Alpha Amylase Enzyme as an Indicator of Dental Anxiety in Patient who Will Undergo Surgical Odontectomy

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**Abstract:** Background: Odontectomy is a minor surgical procedure that mostly leads to dental anxiety. Dental anxiety can interfere odontectomy procedure. Music has been used for various settings of dental anxiety in many research. One of the most effective type of music is relaxation music. This music can also be added with binaural beat effect of alpha brainwave. This combination can effectively induce relaxation responses that can reduce the levels of dental anxiety on patients. Objective: To analyze the influence of music relaxation with binaural beat effect on the level of salivary alpha amylase enzyme as a biomarker of dental anxiety. Method: This study was conducted on 48 participants aged 18-40 years old who came to minor surgery clinic of Oral and Maxillofacial Surgery Department at Dental Hospital of Universitas Padjadjaran who will undergo surgical odontectomy of third molar lower jaw, having no systemic disease or other dental diseases and voluntarily accepted as research subjects. The subjects was divided into 2 groups, control group and intervention group. The patient was measured their salivary alpha amylase enzyme level the first time before intervention, and then the patient was intervened using relaxation music with binaural beat effect for 20 minutes. The control group was simply doing nothing and sitting on dental unit for 20 minutes. After 20 minutes, the patients were measured again for their salivary alpha amylase enzyme level. Results: The research results showed that there was significant decrease ( $p < 0,05$ ) of salivary alpha amylase enzyme level after intervention using relaxation music with binaural beat effect. Conclusion: Relaxation music with binaural beat effect can reduce the level of salivary alpha amylase enzyme as indicator of dental anxiety in patients who will undergo surgical odontectomy.

**Keywords:** Dental anxiety, Relaxation music, Binaural beat, Salivary alpha amylase enzyme

## 1. Introduction

Odontectomy is a minor surgical procedure for the removal of impacted teeth that is often extracted daily by an oral and maxillofacial surgeon. The prevalence of impacted teeth is still high, the most frequently teeth affected are third molar, because it is the last tooth that erupts in the oral cavity, which is between the ages of 17-21.<sup>1-4</sup> Population of impacted third molar is around 33%, which is still quite large.<sup>1</sup>

Odontectomy often causes anxiety in patients because of psychological concerns on events, such as injecting local anesthesia, pain, and observation on equipments as well as complications that may occur.<sup>5-7</sup> Excessive dental anxiety in the patient will interfere the procedure of surgical odontectomy. It is not only detrimental to the patient, but also to the dentist because of the consequences that may happen like canceling a visit, being late, being uncooperative, unable to carry out the whole treatment procedure or remembering post-care instructions.<sup>8</sup>

Dental anxiety can cause several symptoms, namely physiological and emotional symptoms. Physiological symptoms can include increased of pulse, blood pressure, palpitations, nausea, sweating, trembling, out of breath, feeling choked, dizzy and weak, etc.<sup>9-10</sup> Salivary alpha-amylase is one of dental anxiety biomarker that associated with sympathetic adrenal medullary (SAM) system.

Evidence from comparative studies shows that changes in salivary alpha-amylase enzyme levels are an accurate indicator of an individual's stress response, due to the high sensitivity of the SAM system. Therefore this salivary alpha amylase enzyme is used as an acute and chronic biomarker of anxiety.<sup>11-13</sup>

Music had been widely used as one of alternative method to reduce dental anxiety.<sup>14-15</sup> Even so various music is considered not effective, there are several researchs confirmed that relaxation music is effective to reduce anxiety.<sup>16-17</sup> Relaxation music is characterized with slow tempo, harmonic melody, repetitive rhythm, soft dynamic, meditative, and minimal use of percussive instrument. It also mostly combined with nature sounds like birds, waves, wind, flowing water, etc.<sup>15-18</sup> This relaxation music can also be combined with binaural beat effect.

Binaural beat effect is an effect that is produced by difference of frequency that was given on the right and left ear of the listener. This effect can only be produced by the use of earphone or headphone.<sup>19</sup> Binaural beat effect can modify the brainwave into alpha wave (8-13Hz) which leads the listener into a relaxed state, but not asleep.<sup>19</sup> Both of the relaxation music and binaural beat effect will cooperate together to enhance the relaxing response.

Based on the above matters, the researcher was interested in analyzing the influence of relaxation music with binaural beat effect on salivary alpha amylase enzyme as indicator of

dental anxiety in patients who will undergo surgical odontectomy.

## 2. Method

The study involved 48 patients aged 18-40 years who will undergo surgicalodontectomy of mandibular third molar impacted teeth in the Minor Surgery Clinic of the Oral and Maxillofacial Surgery Unit of the Dental Hospital of Universitas Padjadjaran. Subjects of this study was patients without a history of systemic disease or other dental diseases. Before the study began, ethical approval had been submitted to the Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran and researchers had obtained an Ethics Approval. All study samples that agreed to participate in this study signed a Statement of Approval to participate in the study. The subjects were divided into 2 groups, group 1 is the control group that was having no intervention by not doing anything but sitting on dental unit for 20 minutes, while group 2 had a relaxation music with binaural beat effect for 20 minutes. The sample was measured for the levels of salivary alpha amylase enzymes using the cocorometer both before the intervention and after the intervention. The control group was measured twice between a 20 minutes duration of waiting on the dental unit. The data of salivary alpha amylase enzymes level was obtained and statistically analyzed using the t-test.

## 3. Result

**Table 1:** The Comparison of the Average Value of Salivary Alfaamylase enzyme levels Pre and Post-Idling for 20 minutes in the Control Group

Sample	Salivary Alpha Amylase	
	Pre	Post
Means	31	31
SD	21,46	19,97
Min	3	4
Max	79	81
n	24	24

Description:

Unit: KU / L

SD: Standard deviation

Min: Minimum value of salivary alpha-amylase enzyme

Max: Maximum value of salivary alpha-amylase enzyme

n: Number of samples

**Table 2:** The Comparison of the Average Value of Salivary Alfaamylase enzyme levels Pre and Post-Treatment of Relaxation with Binaural Beat effect Group

Sample	Salivary Alpha Amylase	
	Pre	Post
Means	37	17
SD	18,39	11,88
Min	5	3
Max	67	39
n	24	24

Description:

Unit: KU / L

SD: Standard deviation

Min: Minimum value of salivary alpha-amylase enzyme

Max: Maximum value of salivary alpha-amylase enzyme

n: Number of samples

**Table 3:** Statistic analysis of Alfa-amylase Saliva Enzyme levels Pre and Post-Idling for 20 minutes in the Control Group

Sample	Salivary Alpha Amylase Enzyme
Means	-0,42
SD	11,436
Min	-24
Max	19
n	24
t	0,18
p-value	0,43

Description :

Unit: KU / L

SD: Standard deviation

Min: Minimum value of salivary alpha-amylase enzyme

Max: Maximum value of salivary alpha-amylase enzyme

n: Number of samples

Based on the statistic analysis result, there is no significant differences of salivary alpha amylase enzyme levels in pre and post idling for 20 minutes in the control group. ( $p > 0,05$ )

**Table 4:** Statistic analysis of Salivary Alfaamylase enzymes levels Pre and Post-Treatment of relaxation music with binaural beat effect Group

Sample	Salivary Alpha Amylase Enzyme
Means	-20,92
SD	12,639
Min	-49
Max	-2
N	24
t	8,11
p-value	0,01

Description:

Unit: KU / L

SD: Standard deviation

Min: Minimum value of salivary alpha-amylase enzyme

Max: Maximum value of salivary alpha-amylase enzyme

n: Number of samples

Based on the statistic analysis results, there is significant decrease in salivary alpha amylase enzyme ( $p < 0,05$ ) in the relaxation music with binaural beat effect group.

**Table 4:** T-Test statistic analysis of Salivary Alfaamylase enzymes levels Comparison of Control Group with Intervention Group

Sample	Salivary Alpha Amylase Enzyme
Means	-20,5
SD	3,479
p-value	0,000

Description:

Unit: KU / L

SD: Standard deviation

Based on the T-Test statistic analysis results, there is significant decrease in salivary alpha amylase enzyme ( $p < 0.05$ ) in the relaxation music with binaural beat effect group compared with control group.

#### 4. Discussion

Dental anxiety is one of common problems encountered in daily practice, especially in the patients who will undergo surgical odontectomy procedure.<sup>5</sup> The stress and anxiety of this condition was mainly caused by uncertain thoughts psychologically induced by several conditions, like pain, injection of needles for anesthetic purposes, and the use of drill in a dental treatment.<sup>5-7</sup> This condition is triggering a signal to the hypothalamus, increasing the activation of SAM system and releasing acetylcholine, resulting in chromaffine cell membrane depolarization which made a cell producing catecholamines, namely L-DOPA, dopamine, norepinephrine, and epinephrine. Furthermore, cell membrane depolarization will subsequently opens ion channels then  $Ca^{2+}$  ions will flow into the chromaffine cells, inducing an increase in exocytosis of catecholamines consisting of norepinephrine and epinephrine. With the increase of secretion of norepinephrine, salivary alpha-amylase enzyme secretion increases. Hence, salivary alpha amylase enzyme level is a reliable biomarker of anxiety and stress.<sup>9, 21-23</sup>

Relaxation music has been studied by several research that also showing good and promising results compared to other type of music. Relaxation music is typically characterized with slow tempo, harmonic melody, repetitive rhythm, meditative, and minimal use of percussive instrument. This also combined with nature sounds like birds, waves, wind, flowing water, etc.<sup>15-18</sup> Relaxation music influencing the limbic system as the center of emotional senses to induce a relaxing response. This direct effect is a psychological pathway and may give various results due to individual preferences.<sup>24</sup>

The relaxation music can be added with binaural beat effect. The binaural beat effect is targeted to modify the brainwave into alpha wave (8-13Hz).<sup>19</sup> The mechanism of binaural beat effect is through a Frequencies Following Responses (FFR) that works through the brain, and decreasing the neuron activity.<sup>25,26</sup> Both of this treatment can synergically works to induce relaxing responses.

The result of this study showed a significant result ( $p < 0.05$ ) of decreasing the salivary alpha amylase enzyme levels in the group of relaxation music with binaural beat effect on pre and post intervention. Furthermore, it is also significant ( $p < 0.05$ ) compared with control group. By means of this result, the use of relaxation music with binaural beat effect can be concluded effectively reducing salivary alpha amylase enzyme levels as an indicator of dental anxiety and stress. This study is also similar to some research that was also using relaxation music with binaural beat effect but on different type of treatment.<sup>26</sup> This may suggest that this type of intervention can be used in many kinds of anxiety settings and conditions.

#### 5. Conclusion

Relaxation music with binaural beat effect therapy can reduce salivary alpha amylase enzyme levels in patients who will undergo surgical odontectomy. In conclusion, this treatment can effectively reduce dental anxiety.

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