Pandan Leaves (Pandanus Amaryllifolius) Aromatherapy and Relaxation Music to Reduce Dental Anxiety of Pediatric Patients

Seno Pradopo¹*, Betadion Rizki Sinaredi¹, Bernadeth Vindi Januarisca²

1. Departement of Pediatric Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya – Indonesia.
2. Undergraduate student, Faculty of Dental Medicine, Universitas Airlangga, Surabaya – Indonesia.

Abstract
Anxiety is one type of emotional disorders that can cause a major problem and frequently experienced by patients who will undergo examinations and dental treatment, particularly pediatric patients, causing children delaying and refusing to undergo dental treatment. Few methods can be done to reduce the anxiety level, both pharmacological and non-pharmacological, including the use of aromatherapy and music therapy. Pandan leaves are one of the plants commonly used as an aromatherapy ingredient in Indonesia. One of the types of music that is commonly used in anxiety treatment is relaxation music.

To determine the effect of pandan leaves aromatherapy and relaxation music to reduce the anxiety level of pediatric patients undergoing dental treatment.

This research was conducted in four groups with four different treatments: control group, pandan leaves aromatherapy group, relaxation music group, and combination group. Each group consisted of 20 samples. Patients recieved dental treatment (fissure sealant) for the first time. Measurements of blood pressure and pulse rate as indicators of anxiety were done before and after treatment using digital sphygmomanometer.

There were significant differences of blood pressure and pulse rate between the control group and the other groups, while the most significant difference experienced by the combination group (p<0.05).

Pandan leaves aromatherapy and relaxation music can reduce the anxiety level of the pediatric patients undergoing dental treatment.

Received date: 23 September 2017 Accept date: 16 October 2017

Keywords: Anxiety, pandan leaves aromatherapy, relaxation music, pediatric patients.

Introduction
Anxiety is a condition that is characterized by intense feeling of dread, accompanied by somatic symptoms that indicate a hyperactive autonomic nervous system.¹ It is one type of emotional disorders related to unforeseen situations or considered dangerous. Observable physiological signs are sweating, increasement of blood pressure, tachycardia, palpitations, dry mouth, diarrhea, muscle tension, and hyperventilation.² Anxiety impairs cognition and may produce distortions of perception.³ Worldwide prevalence of dental anxiety is high, reaching 6-15% of the population and usually starts from childhood (51%) and teens (22%).⁴ A study showed that 25% of young school age children (5-7 year) underwent dental treatments experiencing severe anxiety, 50% moderate anxiety, and 20% experiencing mild anxiety.⁵

Helping pediatric patients to overcome fear and anxiety can improve regularity and scheduled visitation to the dentist and ultimately improve the patient’s life quality.⁶ Both utilizing pharmacological and non pharmacological materials has been done to reduce anxiety level, one of the method is by aromatherapy.⁷ One of the plants that can be used as an aromatherapy ingredient is pandan leaves. Pandan is a monocotile plant of the family Pandanaeaceae that is commonly found in Southeast Asia, particularly Indonesia. Pandan leaves have a distinctive aroma and contain

*Corresponding author:
Prof. Seno Pradopo, DDS., Ph.D.,
Department of Pediatric Dentistry, Faculty of Dental Medicine,
Mayjen. Prof. Dr. Moestopo 47, Surabaya, Universitas Airlangga,
Surabaya – Indonesia, 60132.
E-mail: seno-p@fkg.unair.ac.id; demitriasantoso@yahoo.com

Volume · 10 · Number · 3 · 2017
alkaloids, flavonoids, and tannins that produce sedative effects, overcoming pain and anxiety, and reducing anxiety. In addition to aromatherapy, music therapy is one way to overcome anxiety without any side effects compared to the use of sedative drugs that can cause subjective side effects. Since the ancient Greeks era music has been used as a means to alleviate pain and help patients to cope with painful emotions such as anxiety, sadness, and anger. Classical music is commonly selected for music relaxation therapy, because the elegance and clarity of the musical elements that is considered able to improve concentration, memory, and perception of the listener. Previous study emphasized that the use of orange essence oil aromatherapy while doing dental treatment in pediatric patients can relieve anxiety. Other study proved that classical music has an influence in reducing pediatric patient’s anxiety during the plaque control record treatment.

This study intend to conduct a research using pandan leaves aromatherapy and relaxation music, to assess whether these methods are able to reduce the anxiety level of pediatric patients undergoing dental treatment. The study focused on measuring blood pressure and pulse frequency while the patients were treated for fissure sealant application.

**Materials and methods**

This study was an experimental research with pre-post groups design. The population were students of Santa Clara Catholic Elementary School, Surabaya in 1st grade. Inclusion criteria were aged 5-7 years old, the first permanent molar tooth had erupted, and good health condition. Students with a history of any dental treatment, psychiatric disorder or mental retardation, systemic disease, and currently use any medication are excluded from the study.

Sample were divided into 4 groups: control (without aromatherapy and music/group 1), pandan leaves aromatherapy (Group 2), relaxation music (Group 3), and combination (Group 4) (n=80). The samples were given an informed consent and signed by their parents. This study was approved by the ethical committee of Faculty of Dental Medicine, Universitas Airlangga (No: 189/KKEPK.FKG/VIII/2016).

This study was conducted at school student health unit. The subjects were instructed to sit on the dental chair for 5 minutes before starting the treatment (fissure sealant application). Blood pressure and pulse rate was measured before and after the treatment. Blood pressure was measured using digital sphygmomanometer (Omron, India) and pulse rate was measured within 1 minutes on radial artery. During treatment, pandan aromatherapy (Bali Tropical, Bali, Indonesia) and music relaxation (classical music) were played. Statistical analysis was conducted using Anova and Tukey HSD.

**Results**

The mean and standard deviation of the difference in systolic blood pressure, diastolic blood pressure, and pulse rate on each group is showed in Table 1. A nonparametric test was conducted using the Kolmogorov-Smirnov test. The analysis showed all four treatment groups were statistically significant (p > 0.05), Group 1 p=0.376, Group 2 p= 0.661, Group 3 p= 0.426, Group 4 p= 0.557. The homogeneity of variance was tested using Levene test and the result was that the entire data were statistically significant (p > 0.05), systole difference p=0.051, diastole difference p=0.385, and pulse difference p=0.808.

<table>
<thead>
<tr>
<th></th>
<th>Systole</th>
<th>Diastole</th>
<th>Pulse Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x} \pm SD$</td>
<td>$\bar{x} \pm SD$</td>
<td>$\bar{x} \pm SD$</td>
</tr>
<tr>
<td>Group 1</td>
<td>11.60 ± 8.152</td>
<td>9.05 ± 8.062</td>
<td>10.80 ± 7.544</td>
</tr>
<tr>
<td>Group 2</td>
<td>-2.45 ± 5.951</td>
<td>-1.50 ± 6.755</td>
<td>-0.75 ± 8.503</td>
</tr>
<tr>
<td>Group 3</td>
<td>-0.30 ± 6.997</td>
<td>0.00 ± 5.807</td>
<td>-0.35 ± 7.436</td>
</tr>
<tr>
<td>Group 4</td>
<td>-6.85 ± 5.143</td>
<td>-6.00 ± 4.888</td>
<td>-8.30 ± 6.837</td>
</tr>
</tbody>
</table>

Table 1. Mean and standard deviation value of the difference in systolic blood pressure, diastolic blood pressure, and pulse rate on each group.

The result of Tukey HSD test showed Group 1 positive (+) values on the mean difference of systole, diastole, and pulse rate, which means there was an increasing in values in the data before and after treatments. Group 2 obtained negative (-) values on the mean...
difference of systole, diastole, and pulse rate, which means there was a decreasing in values from before and after treatments. Group 3 indicated positive (+) value on the mean difference of diastolic blood pressure, but negative (-) value on the mean difference of systolic blood pressure and pulse rate. While in Group 4 there were negative (-) values on the mean difference of systole, diastole, and pulse rate.

One-Way ANOVA test was conducted and obtained significance value of p= 0.000 on all three mean difference variables (p < 0.05), indicates there were significant differences among the four treatment groups on these three variables. The statistical analysis was continued using Tukey HSD test. The analysis results showed that there were significant differences on the mean difference in systole, diastole, and pulse rate between control group and the three experimental groups, p= 0.000. In addition, there was also a significant difference in those three aspects between Group 3 and Group 4 (systole p=0.014, diastole p= 0.010, pulse rate p=0.08). There was also significant difference in the pulse rate mean between Group 2 and Group 4 (p=0.013). Other comparison between Group 2 and Group 3 (systole p= 0.738, diastole p= 0.0736) between Group 2 and Group 4 (mean difference in systole and diastole) revealed no significant difference.

Discussion

Anxiety is a psychological symptom of unpleasant incident or discomfort along with a sign that something undesirable will happen.13 Anxiety is the manifestation of individual nature and perceptions rooted in a person to anticipate the feeling of being threatened. When anxiety was prolonged, it can turn into anxiety disorders.14 Dental anxiety is the main factor that hinders patients’ visits to the dentist.15

Aromatherapy is a treatment method using certain aroma stimuli media derived from certain plant materials.16 Previous studies showed inhaling aromatherapy can reduce a person’s anxiety level.17,18 This study used pandan leaves aromatherapy product as pandan leaves are considered to possess the compounds that induce a sedative effect that will reduce anxiety level.19 Relaxation music is one kind of music considered to be able to stimulate the brain to produce α-wave and brings a relaxing effect on the listeners. Relaxation music can help overcoming anxiety caused by psychological effect, such as by lowering blood pressure, pulse rate, and respiratation rate so that the patient becomes more relaxed and calm.20 Relaxation music used in this study was the orchestration of classical music (songs composed by Mozart, Chopin, Handel, Bach, and Vivaldi) that have bigger impact to anxiety level compared to other types of music.21

The results on Group 1 showed no decreasement in blood pressure and pulse rate, indicates the increasement of anxiety level. According to the previous studies, patients become anxious when facing a treatment, causing increasement in blood pressure, pulse rate, and respiratory rate.22,23 The results on Group 2 showed decreasement in blood pressure and pulse rate after the treatment, it indicates reduction of anxiety level. The anxiety reduction effect due to pandan leaves aromatherapy was significant compared to anxiety level occured in the control group. Aromatherapy can affect the patient psychologically and physically.24 Aromatherapy pandan leaves (Pandanus Amaryllifolius) contain alkaloids and it affected the gamma-aminobutyruc acid (GABA) receptors. GABA receptor is an important target for hypnotic-sedative components in humans that can cause relaxation and decrease anxiety level. The results of this study affirms the previous studies, showing that aromatherapy inhalation applied for Intensive Care Unit (ICU) patients is effective reducing anxiety level and improving patients’ sleep quality.25

The results of Group 3 showed decreasement in blood pressure and pulse rate after treatment, point that auditory stimuli can put a person into relaxed state.26 Previous study stated that music therapy can reduce sleep problems, relaxing, and eliminating unpleasant feelings.27 Listening to music with soft and soothing rhythm with the tempo of 60-80 per minute causing decreasement of the body rhythm, because the body adjusts to the rhythm of the music.28 Music also affects the decreasement in sympathetic nerve responses, resulting vital signs decreasement.
The results of this research showed relaxation music is less significant compared to pandan leaves aromatherapy in affecting the reduction of anxiety level, although there were several samples that experienced the opposite. This insignificance presumably because the subject might have never heard the instrumental classical music. Individual taste of music plays an important role in reducing the anxiety. The more familiar an individual to a piece of music, the greater effect on the response.

Significant differences of reduction in anxiety level using relaxation music and pandan leaves aromatherapy can also be affected by different response pathways of each stimulus. Pandan leaves in aromatherapy treatment contributed to the decrease in muscle contraction and made the samples relaxed, increasing of β-endorphins secretion, decreasing of ACTH secretion, and the effect on the sympathetic and parasympathetic nervous system. While in relaxation music treatment, it induced the similar physiological effects, except for the potential actions or muscle contraction.

Research results on group 4 revealed mean difference of the three variables was negative (-) and the largest mean difference among other treatment groups. Group 4 showed the highest decrease in blood pressure and pulse rate, indicates the highest reduction of anxiety level. By combining the pandan leaves aromatherapy and relaxation music treatments, the samples received two types of stimulation that affects on body relaxation. These results were in accordance with previous studies which stated that the combination of aromatherapy and music therapy may result in reduction in anxiety level more compared to the use of aromatherapy or music therapy alone.

Compared to the Group 3, combination treatments significantly reduces sample's anxiety level. But in comparison to Group 2, significant differences occurred only in the mean difference of pulse rate. This can be caused by the work function of the heart in systolic and diastolic pressure. The heart, as a body generator, functions to pump blood and work hard to ensure that the mean pressure throughout the arterial system in the cardiac cycle is always the same in all organs. Blood pressure needs to be in constant rhythm so that systemic blood flow remains smooth.

There are several factors that influencing the difference of anxiety level reduction on samples. The main factor is the different mechanisms of individual's anxiety level reduction, varied from easy to feel relax to more difficult and very tense. Time lapse is also another important factor. The time difference in receiving treatment (received treatment in the morning as they arrived at school or in the afternoon after break hour), a sense of familiarity with the school's conditions, coupled with tiredness and fatigue after morning activities could affect blood pressure and pulse rate. This occurs due to the influence of time (morning/afternoon) on the condition of β-endorphins in the body, level β-endorphins in the body is at its highest in the morning (around 9 am) and its lowest point in the evening (around 8 pm). Appearance of a dental care operator might be the factor causing difference of anxiety level reduction. A study observed changes in childrens' heart rate, showing increase in by 10 beats per minute above the initial state when they saw a dentist dressed in a white coat.

The gender differences did not affect the scale of anxiety level reduction. Based on data analysis, there was no significant difference in the value of mean difference of systole, diastole, and pulse rate between male and female samples in each treatment group. The absence of gender influence on the reduction in anxiety is implied on the previous studies related to anxiety level.

Conclusions

Based on the study results, the use of pandan leaves aromatherapy and relaxation music affect the reduction in anxiety level of pediatric patients undergoing dental treatment and the highest reduction significantly occurred in patients treated with a combination of pandan leaves aromatherapy and relaxation music.

Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.
References


