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The Effect of Sape Music on Salivary Flow Rate

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Abstract

Introduction: Hyposalivation can negatively impact oral health, so the flow rate of saliva needs to be increased. Music with a calm and peaceful atmosphere has been shown to increase the salivary flow rate. **Purpose:** This study aims to evaluate the effect of Sape music on salivary flow rate. **Methods:** This study used quasi-experimental research with a one-group pretest-posttest approach involving 20 students from the Dentistry Study Program, Faculty of Medicine, Sriwijaya University. Unstimulated saliva was collected in the morning before listening to music using the spitting method for 5 minutes. Subjects were presented with Sape music stimuli for 15 minutes. and during the final 5 minutes of the music session, saliva was collected again using the same spitting method. The collected saliva was recorded as the salivary flow rate in g/minute. Data were analyzed using a parametric paired T-test and were considered significant if the p-value <0,05. **Result:** The result showed that the mean of salivary flow rate after listening to Sape music was 0,411± 0,142 g/minute, which was higher than before lisitening, which was 0,558±0,135 g/minute. The paired T-test analysis showed a significant difference in salivary flow rate before and after listening to Sape music which the p-value was 0,001 (p<0,05). **Conclusion:** Sape music can increase the salivary flow rate.

Keywords: Auditory stimuli; salivary flow rate; sape music

Introduction

Saliva is a biological secretion produced by the salivary glands that plays a vital role in maintaining oral health, facilitating food digestion, preserving moisture in the oral cavity, contributing to systemic homeostasis, and providing antimicrobial defense.[1] In healthy adults, average daily saliva production ranges from 1 to 1,5 liters, with unstimulated salivary flow rates typically between 0,3 and 0,4 ml/min and stimulated flow rates ranging from 1 to 3 ml/min.[2,3] A stimulated salivary flow rate of less than 0,1 ml/min is classified as hyposalivation.[3] A low salivary flow rate can negatively affect oral health, including an increased risk of dental caries. Saliva production can be stimulated using a non-pharmacological approach through stimulation of the parasympathetic nerves by providing a calm and relaxing atmosphere, such as listening to music.[4]

Music has been known to affect physiological processes that improve physical and mental well-being.[5] Classical music is one of the genres often tested in the health field because it has a peaceful and calm atmosphere that impacts a calmer and more relaxed psyche.[6] Jin et

al. reported that using classical music as an auditory stimulus can increase the salivary flow rate by 0,515 ml/min compared to the silent atmosphere of 0,329 ml/min.[7]

Sape music, a traditional musical instrument from Kalimantan played by plucking, has a soft, characteristic tone.[8] Sape music has also been tested in the health sector, including reducing anxiety levels, blood pressure, and post-operative pain scales. Sape music has never been tested for its effect on salivary flow rate, even though it has a soft tone that may create a calmer and more relaxed state that stimulates parasympathetic nerves that play a role in salivary secretion. University students commonly experience academic-related stress, which can influence autonomic nervous system activity and salivary secretion. This study aims to evaluate the effect of Sape music on salivary flow rate.

Methods

This study used an experimental one-group pretest and posttest design. The procedure has been approved by the Medical and Health Research Ethics Committee, Faculty of Medicine, Sriwijaya University (protocol number 024-2025).

Sampling design

This study involved 20 female students from the Dentistry Study Program, Faculty of Medicine, Sriwijaya University, aged 19-22 years. This study was conducted exclusively on female participants to reduce biological variability and enhance sample homogeneity. Participants were required to be willing to participate in the study, be in good physical health and have a healthy oral cavity, participants had to be free from symptoms of fever, cough, and cold.[9,10] The participants reported no hearing impairments.[11,12] Any participants with the presence of oral complaints such as dry mouth sensations or lesions in the oral cavity, consumption of medications that affect salivary gland function, a history of radiation therapy, particularly in the head and neck region, smoker or had a history of smoking, systemic diseases, gastroesophageal reflux disease (GERD), obesity (body mass index $\geq$ 30 kg/m^2) and undergoing orthodontic treatment were excluded from this study.[13,14] Participants were instructed to fill out and sign informed consent after the study procedure was explained.

Saliva collection

The study started at 9 AM - 12 PM in a quiet room at room temperature. The Sape music used in this study was a modified version of a song titled Sape Uyau, obtained from the YouTube channel of Uyau Moris. Sape music was provided to the participants via Google Drive. Participants were instructed not to consume food or drinks for at least two hours before and during the study. Earphones were connected to a laptop with the volume set at 60%. Each participant received distilled water, a rinsing cup, a plastic waste container, a funnel, and a 15 ml centrifugation tube. Participants were asked to rinse their mouths with distilled water, dump it into the plastic container, and then swallow any remaining saliva in the oral cavity. Unstimulated saliva was collected in the morning using the spitting method, which involved spitting into the centrifugation tube every 60 seconds for 5 minutes. Participants were given a 10-minute rest period and listened to the Sape music for 15 minutes. During the final 5 minutes of the music session, saliva was collected again using the same spitting method. The saliva volume in the centrifugation tube was measured using a digital scale, and the flow rate was calculated and recorded.

Statistical Analysis

The data were analyzed statistically. Data normality was verified by the Shapiro-Wilk test. The data were analyzed using a paired T-test, and $p<0.05$ was considered statistically significant.

Results

The Shapiro-Wilk normality test was performed and showed $p>0,05$, indicating that the data were normally distributed. The result of the paired T-test is shown in Table 1.

Table 1. Mean Stimulated Salivary Flow Rate (g/min) with Sape Music

Type of Stimulus	N	Mean (g/min) ± SD	*p-value*
Before listening to Sape music	20	0,411 ± 0,142	0,001*
After listening to Sape music	20	0,558 ± 0,135	

*paired t test; significant difference ($p<0,05$); standard deviation

The results in Table 1 show that the average salivary flow rate increased after listening to Sape music compared to before. The paired T-test analysis showed a p-value 0,001 ($p<0,05$), indicating a significant difference in salivary flow rate before and after listening to Sape music.

Discussions

The results of this study indicate that auditory stimulation using Sape music can enhance salivary flow rate. This finding aligns with the study by Jin et al., which reported that classical music increased salivary secretion to 0,515 ml/min, compared to 0,358 ml/min for rock music and 0,329 ml/min for silence.[7] Sape music features a soft and calming tone, similar to classical music, which may induce relaxation and activate the parasympathetic nervous system.[15] Parasympathetic stimulation is known to stimulate the secretion of watery and high-volume saliva from the major salivary glands.[7]

The auditory pathway transmits sound waves from the external auditory canal to the tympanic membrane and into the central nervous system, particularly the hypothalamus, which coordinates autonomic nervous function. Relaxing auditory stimulation may influence hypothalamic and autonomic activity, promoting parasympathetic dominance.[15] The shift towards parasympathetic dominance enhances salivary gland secretion and may contribute to increased salivary flow rate.[16] This study showed that the mean salivary flow rate increased from 0,411 g/min before the intervention to 0,558 g/min after listening to Sape music. Although this value exceeds the average unstimulated salivary flow rate of 0,3–0,4 ml/min, it remains lower than the flow rate induced by mechanical stimulation, such as chewing, which typically ranges from 1 to 3 ml/min.[2]

A wide range of salivary flow values was observed after listening to Sape music, with the lowest recorded value being 0,387 ml/min and the highest reaching 0,854 ml/min. This variation may reflect individual differences in physiological responses to auditory stimuli, as indicated by the relatively high standard deviation observed in the data. Furthermore, the small sample size (n = 20) may have contributed to data variability and limited the generalizability of the findings. Future studies should aim to increase the sample size to reduce extreme data variations and strengthen the statistical analysis.

This study observed that three participants experienced a decrease in salivary flow rate after listening to Sape music. Specifically, Subject 2 showed a 0,219 ml/min reduction, while Subjects 3 and 12 had 0,066 ml/min decreases. These results may have been affected by uncontrolled external variables such as personal music preference or emotional states. It is well established that psychological factors like stress and anxiety can influence autonomic nervous activity, particularly by increasing sympathetic tone, which inhibits salivary secretion.[17] Future

studies should include an objective assessment of stress and anxiety levels, such as the State-Trait Anxiety Inventory (STAI), to gain a clearer understanding of their relationship with salivary gland function.[18]

The participants in this study were between 19 and 22 years old, and they were categorized as young adults. This finding aligns with a study by Jin et al., which examined subjects aged 20–23 years and reported a similar increase in salivary flow after classical music exposure.[7] However, salivary gland function is known to decline with age due to cellular and structural changes in the gland, which can affect salivary output.[19] Previous research has shown that Sape music can produce physiological effects across various age groups. Palimbunga et al. found that Sape music lowered systolic blood pressure in elderly patients with stage I hypertension, while Ndeta et al. reported a reduction in postoperative pain intensity among patients aged 18–60.[11,20] Thus, future research could include subjects from different age groups or patients with hyposalivation to determine whether Sape music yields consistent or greater effects in these populations.

The duration of the intervention in this study was 15 minutes. However, other studies using Sape music have employed different durations. Wardani et al. observed a reduction in anxiety among full-term pregnant women after 10 minutes of daily Sape music therapy over three consecutive days.[21] Repeated or prolonged stimulation could produce a stronger parasympathetic response, leading to more pronounced physiological effects, such as increased salivary secretion. Therefore, future studies should consider evaluating the influence of varying durations and frequencies of exposure to optimize the effects of music therapy.

This study focused exclusively on one type of Sape music called Sape Uyau. There are several variations of Sape music, including Sape' Dua Ting (Dayung) and Sape Kenyah, each with unique musical structures and tempos that may induce different physiological effects.[8] Further research could explore the effectiveness of various types of Sape music in stimulating salivary flow.

Based on the findings of this study, it is recommended that future research employ a larger sample size to reduce extreme variations and lower the standard deviation, thereby increasing statistical reliability. Further studies should also involve participants with broader age ranges or patients with hyposalivation and examine different types of Sape music to determine whether similar or enhanced effects on salivary flow rates can be observed. Additionally, Sape music can be more widely incorporated into healthcare facilities and public media settings, as it holds

potential as a culturally rooted, non-pharmacological method to improve salivary secretion and promote oral health.

Conclusion

The current study showed that Sape music increased salivary flow rate and may be considered a non-pharmacological method of supporting oral health. Sape music is expected to have the potential to increase salivary flow rate in patients with hyposalivation in the future.

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