

The Effect of Kacapi Suling "Ayun Ambing" on Saliva Flow Rate

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ABSTRACT

Background: Hyposalivation has a negative effect on oral health such as causing the risk of oral candidiasis and caries, so it is necessary to increase the salivary flow rate by using auditory stimuli such as music. One of the music that can be used is the Kacapi Suling "Ayun Ambing". The Kacapi Suling "Ayun Ambing" music comes from West Java which has a calm, slow and relaxed tone, but its effect on salivary flow rate has never been studied. This study aims to determine the effect before and after listening to Kacapi Suling "Ayun Ambing" on salivary flow rate.

Method: This study used a pre-experimental study with a post-test only design approach involving 20 female students of the Department of Dentistry and Oral Medicine, Sriwijaya University aged 19-23 years. Saliva was collected before listening to music using the spitting method for 5 minutes every 60 seconds. Subjects were given the Kacapi Suling "Ayun Ambing" music stimulus for 15 minutes then in the last 5 minutes saliva was collected every 60 seconds. The collected saliva was recorded as the value of saliva flow rate in g/minute. Data were analyzed using the Shapiro-Wilk test and paired T test.

Results: The results showed that the average saliva flow rate after listening to the Kacapi Suling "Ayun Ambing" music was higher than before listening to the music ($p < 0.05$).

Conclusion: Listening to the Kacapi Suling "Ayun Ambing" music has an effect on increasing the saliva flow rate.

Keywords: saliva flow rate, kacapi suling, ayun ambing

INTRODUCTION

Saliva is a complex, colorless oral cavity fluid composed of a mixture of secretions from the major and minor salivary glands present in the oral mucosa.¹ The normal unstimulated salivary flow rate is 0.3-0.4 ml/min, while the stimulated rate is 1.5-2.0 ml/min.² Hyposalivation is characterized by a decrease in the unstimulated salivary flow rate to less than 0.1 ml/min and a stimulated rate of $\leq 0.5-0.7$ ml/min.³ A reduction in salivary flow can trigger xerostomia, or dry mouth, leading to difficulties in swallowing, chewing, speaking, and denture use.⁴ The prevalence of hyposalivation among 158 individuals in Yogyakarta was reported at 25.3%, with xerostomia at 59.5%.⁵

Hyposalivation is caused by factors such as age, medications like antihypertensives, systemic diseases such as diabetes mellitus, salivary gland disorders like Sjögren's syndrome, and stress.⁴ Stress can significantly reduce salivary flow rate, leading to dry mouth.⁶ The salivary flow rate in dental students experiencing high stress was reported to be lower (0.34 ml/min) compared to those with low stress (0.49 ml/min).⁷

Hyposalivation can impair the protective functions of saliva in the oral mucosa, increasing the presence of bacteria and fungi in the oral cavity.⁸ There is a correlation between the number of *Streptococcus mutans* in saliva and the caries index; higher bacterial colonization in saliva corresponds to a higher DMF-T caries index.⁹ Seitaro et al. reported that decreased salivary flow rate is a risk factor for caries development in caries-free permanent teeth among children aged 9-12 years.¹⁰ Hyposalivation is also a risk factor for increased growth of the fungus *Candida albicans* in the oral cavity, potentially leading to oral candidiasis.⁹

Several methods can address hyposalivation, including adequate hydration, chewing sugar-free gum, avoiding hard foods, and using salivary stimulants such as mouthwashes, gels, and toothpaste.¹¹ Hyposalivation can also be managed with systemic medications like pilocarpine and cevimeline.¹¹ Various stimuli, including chewing, taste, olfactory (smell), and auditory (hearing), can stimulate increased salivary flow.¹² Auditory stimulation through music has been reported to stimulate salivary flow.⁷

Music can serve as an alternative therapy in healthcare.¹³ One commonly used genre is classical music, which has been reported to reduce stress in students working on theses.⁷ Classical music can also increase salivary flow; for instance, Dewi's study reported that listening to classical music for 13 minutes effectively increased salivary flow from 0.204 ml/min to 0.087 ml/min.⁷ Indonesia has a variety of traditional music, including *kacapi suling* music from West Java, featuring the *kacapi* (a plucked string instrument).¹³ *Kacapi suling* compositions consist of instrumental pieces with two different scales: some have a more relaxed and melancholic character, while others are slower and more serious.¹³ A commonly used *kacapi suling* piece is "Ayun Ambing," traditionally used by the Sundanese people to lull babies to sleep or during wedding ceremonies.¹⁴

Kacapi suling music has been reported to offer various health benefits.¹³ Sepriliani et al. reported a reduction in pain levels among postpartum mothers after listening to *kacapi*

suling music for 15 minutes using earphones.¹⁵ Herliana et al. also reported a decrease in high systolic blood pressure after listening to *kacapi suling* music "Ayun Ambing" for 5 minutes.¹⁶ Saepul et al reported that anxiety levels in chronic kidney disease patients undergoing hemodialysis decreased after listening to *kacapi suling* music "Ayun Ambing".¹⁷ The effects of *kacapi suling* music "Ayun Ambing" have not been studied in dental and oral health, such as its impact on salivary flow rate. This study aims to investigate the effect of listening to *kacapi suling* music "Ayun Ambing" on salivary flow rate.

METHODS

This study used an experimental one group pretest and posttest design. The procedure of this study has been approved by the Medical and Health Research Ethics Committee, Faculty of Medicine, Sriwijaya University (protocol number 324-2024).

1. Preparation

Before collecting saliva, research subjects meeting the inclusion and exclusion criteria were asked to complete a questionnaire covering personal information, physical and oral health status, history of hearing disorders, history of systemic diseases, history of medications causing dry mouth, smoking history, and provided informed consent. The music used in this study was the *kacapi suling* piece "Ayun Ambing," which was provided to subjects via Google Drive.

2. Sample Criteria

This study involved 20 female students from the Department of Oral and Dental Medicine, Faculty of Medicine, Sriwijaya University, aged 19-23 years. Participants were required to be willing to participate in the study, be in good physical health and have a healthy oral cavity, and have good hearing. Exclusion criteria were smoker or had a history of smoking, have no history of systemic disease and not be taking medication that reduce salivary secretion, no have obesity, defined as a body mass index (indeks massa tubuh ≥ 30 kg/m²) , Participants instructed to fill out and sign informed consent after the study procedure were explained.

3. Research Procedure



Figure 1. Research Procedure

The study will be conducted between 08:00 and 11:00 in a quiet room with controlled room temperature (22-24°C) and good lighting. The research will be conducted face-to-face while adhering to health protocols and is expected to last approximately 30-60 minutes. Participants are instructed to abstain from eating or drinking for at least one hour prior to the study. Each participant will be provided with deionized water, a rinse cup, a plastic container, a funnel, and a 15-ml centrifuge tube. Participants will first rinse their mouths with deionized water to clean any remaining food or drink residue from the oral cavity, disposing of the rinse water into the designated plastic container. They will then swallow any remaining saliva in their mouths before the saliva flow measurement begins.

Saliva will be collected using the spitting method, wherein participants will sit calmly and quietly, tilting their heads slightly downward while holding the centrifuge tube with their right hand. During saliva collection, participants are instructed to close their lips, refrain from moving their tongues, and avoid swallowing saliva. Saliva will be collected into the centrifuge tube at 1-minute intervals for a total of 5 minutes. Ten minutes later, participants will listen to the *kacapi suling* music "Ayun Ambing" for 10 minutes. During the last 5 minutes of listening, participants will collect saliva again using the same method. The volume of saliva in the centrifuge tube will then be weighed on a digital scale, and the flow rate will be calculated in g/min, which is equivalent to ml/min, and the results will be recorded.

4. Statistical Analysis

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

RESULT

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

Table 1. Average Saliva Flow Rate stimulated by Kacapi Suling “Ayun Ambing” music (g/menit)

	Average saliva flow rate (g/menit)	<i>p-value</i>
Before listening kacapi suling “Ayun Ambing” music	0.352	<0,01*
After Listening kacapi suling “Ayun Ambing” music	0.836	

**T test*, signifikan ($p < 0,05$).

The results of this test showed that there was an increase after listening to the flute lute music "Ayun Ambing" compared to before listening to music. The data from the paired t-test proved that the p-value was 0.01 ($p < 0.05$) which means that there was a significant difference before and after listening to the flute lute music "Ayun Ambing". The saliva flow rate after listening to the flute lute music "Ayun Ambing" increased compared to before listening.

DISCUSSION

The results of this study indicate that auditory stimulation using the "Ayun Ambing" kacapi suling music can increase saliva flow rate. This finding is supported by research from Jin et al., which showed that saliva flow rate while listening to classical music increased significantly, with a higher flow rate of 0.515 mg/min compared to silence at 0.329 mg/min.¹⁸

The "Ayun Ambing" kacapi suling music has slow, calm, low, and relaxing tones, which can stimulate saliva flow after listening to the music.⁷ The mechanism through which music enhances saliva secretion is related to the physiological functions of the body, particularly involving the auditory system, central nervous system, and peripheral nervous system.⁷ Music, as sound waves, is received and collected by the outer ear, enters the

external auditory canal to the eardrum, then is transmitted through the vestibulocochlear nerve (cranial nerve VIII).¹⁹ It is then passed to the medulla, directed to the lateral lemniscus, and travels upward to the midbrain.¹⁹ From there, it is relayed to the geniculate body and ends in the acoustic area of the cerebral cortex.²⁰ Information from the midbrain can reach the hypothalamus, which then influences the exocrine glands, including the salivary glands.²⁰

The saliva flow rate before listening to the "Ayun Ambing" kacapi suling music was 0.352 g/min, and after listening to the music, it was 0.836 g/min. This value indicates that the saliva flow rate is higher after listening to the "Ayun Ambing" kacapi suling music compared to the normal saliva flow rate without stimulation, which is 0.3-0.4 ml/min.² Stimulated saliva flow rates reported in the Indonesian population show varied results. Research by Fariha et al. in Jakarta reported a saliva flow rate of 0.528 ml/min after chewing paraffin, and Ramadhani et al. in Palembang reported a rate of 1.19 ml/min after chewing Arabic gum.¹² The results obtained in this study still fall within the range of stimulated saliva flow rates observed in the average Indonesian population.

CONCLUSION

The conclusions of this study is after hearing Kacapi Suling "Ayun Ambing" music can increase salivary flow rate.

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