



Comparison the Effect of Rosella Flower Extract Mouthwash (Hibiscus Sabdariffa L.) and Chlorhexidine on Saliva Ph of Students Department of Dental Health, Poltekkes Palembang

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ABSTRACT

Dental and oral health problems based on The Global Burden Disease in 2016 stated that dental caries is still experienced by almost half of the world's population. One of the factors causing caries is salivary pH. This research is an experimental research with pre and post test designs. The research sample of students from the Department of Dental Health is 100 samples taken by simple random sampling. Data were analyzed using univariate test and multivariate test using One Way Anova Test followed by Post Hoc Test. Based on the results of the study, it was found that in the One way Anova test there was a significant difference in the average of gargling with rosella flower extract mouthwash 20%, 40%, 60%, and chlorhexidine on salivary pH, but based on the Post Hoc test, rosella flower extract mouthwash 20 % as effective as 40% rosella flower extract mouthwash, but different from 60% rosella flower extract mouthwash. Thus, it was concluded that the effectiveness of 60% rosella flower extract mouthwash was significantly stronger in increasing salivary pH than Chlorhexidine mouthwash, this was shown in statistical test.

INTRODUCTION

Dental and oral health problems based on The Global Burden of Disease in 2016, stated that dental health problems, especially dental caries, are a disease experienced by almost half of the world's population (3.58 billion people). The common dental health problem in Indonesia is dental caries with a prevalence of 45.3%, while the incidence of dental caries in South Sumatra reaches 5.3, which means that there are 6 cavities in one person (Ministry of Health RI, 2019). Caries is a chronic disease caused by various factors, this is characterized by the process of demineralization and damage to the hard tissue of the teeth due to the presence of acids produced from the fermentation of carbohydrates by bacteria. Bacteria produced from carbohydrate fermentation result in microbial activity which produces acid resulting in a decrease in salivary pH (Pratiwi Putri et.al., 2020).

Salivary pH is one of the factors related to the process of caries formation. Saliva pH that is below a critical value will trigger tooth demineralization (Pratiwi Putri et.al., 2020). When the salivary pH decreases, then there is an increase in the growth of *Streptococcus mutans* bacteria. *Streptococcus mutans* growth should be inhibited because these bacteria are the cause of caries which are aciduric and acidogenic (Sayyidati, Nuzul and Isnaeni, 2016). In order not to become a pathogen and causes caries, it is necessary to provide antibacterial agents to suppress the growth *Streptococcus mutans* bacteria (Riwandy et.al., 2014). One way to control the degree of acidity (pH) of saliva is the use of mouthwash.

The Indonesian government has supported the use of traditional mouthwash as an alternative way, this is aimed to provide dental health services in Indonesia, and also because Indonesia is a country with various types of plants that are very useful for health. The herbal plants that have antibacterial benefits are Rosella flowers (*Hibiscus sabdariffa* L.). With the antibacterial effect, rosella flower extract (*Hibiscus Sabdariffa* L.) can be used as a traditional mouthwash. Based on this background, the authors are interested to do a research with the title "Comparison of the Effect of Rosella Flower Extract Mouthwash (*Hibiscus Sabdariffa* L.) and Chlorhexidine on Saliva pH of Students of the Department of Dental Health, Palembang Polytechnic".

THEORETICAL REVIEW

Dental and oral health problems based on The Global Burden Disease in 2016 stated that dental caries is still experienced by almost half of the world's population. One of the factors causing caries is salivary pH. A critical salivary pH will trigger dental caries, therefore it is necessary to control the pH with one of the herbal mouthwashes, as an alternative prevention. As for the plants used, such as rosella flowers, this flower is very useful for caries prevention because it has an antibacterial effect. This study entitled Comparison of the Effect of Rosella Flower Extract Mouthwash (*Hibiscus Sabdariffa* L.) and Chlorhexidine on Saliva pH of Students of the Department of Dental Health, Poltekkes Palembang. This research is an experimental research with pre and post test designs. The research sample of students from the Department of Dental Health is 100 samples taken by simple random sampling.

Data were analyzed using univariate test and multivariate test using One Way Anova Test followed by Post Hoc Test. Based on the results of the study, it was found that in the One way Anova test there was a significant difference in the average of gargling with rosella flower extract mouthwash 20%, 40%, 60%, and chlorhexidine on salivary pH, but based on the Post Hoc test, rosella flower extract mouthwash 20% as effective as 40% rosella flower extract mouthwash, but different from 60% rosella flower extract mouthwash. Thus, it was concluded that the effectiveness of 60% rosella flower extract mouthwash was significantly stronger in increasing salivary pH than Chlorhexidine mouthwash, this was shown in statistical test.

METHODOLOGY

This research is an experimental research with pre and post test design to determine the average difference in salivary pH before and after rinsing with rosella flower extract (*Hibiscus sabdariffa* L.) 20%, 40%, 60%, and chlorhexidine. The sampling technique used simple random sampling based on inclusion criteria. The sample of this study were students majoring in dental health at the Palembang Health Polytechnic with a sample of 100 people. Data analysis in this study was using univariate and multivariate analysis, to see the difference in the average increase in salivary pH between groups. Multivariate analysis used the *One Way Anova* statistical test followed by a *post hoc* test to determine the independent variables that most influenced the increase in salivary pH.

RESULTS

This research is about Comparison of the Effect of Rosella Flower Extract Mouthwash (*Hibiscus Sabdariffa* L.) and Chlorhexidine Mouthwash on Salivary pH of Students of the Department of Dental Health, Palembang Health Polytechnic. In this study, salivary pH measurements will be carried out using a pH meter, which will be taken from saliva samples in each treatment group before and after rinsing with Rosella Flower Extract Mouthwash with concentrations of 20%, 40%, and 60%. Chlorhexidine mouthwash, as well as Aquades. From the research conducted, the results were obtained.

Table 1. Distribution of Average Saliva pH Before and After Gargling in Each Treatment Group

Treatment Group	N	Average Saliva pH		The Average Difference of Saliva pH Before and After Treatment
		Before	After	
Rosella Flower Extract 20%	20	6,955	6,985	+0.03
Flower Extract Roselle 40%	20	6,68	7,275	+0.595
Rosella Flower Extract 60%	20	6,275	7.45	+1.175
Chlorhexidine	20	6,495	7,25	+0.755
Aquades	20	6,745	6,725	- 0.02

Based on table 5.1, it shows that rosella flower extract mouthwash 20%, 40%, 60%, and chlorhexidine can increase the pH of saliva, while distilled water cannot increase the pH of saliva.

Table 2. Statistical Results Using One Way Anova

		Mea nSqu are	F Coun t	Sig.
Saliv a pH	Between Groups	2,67 5	18,087	0.000
	Within Groups	0.14 8		

Based on table 2 shows that from the results of the One Way Anova Test analysis, a P Value of 0.000 ($P < 0.05$) was obtained, it can be concluded that there is a significant difference in the average salivary pH after rinsing with rosella flower extract mouthwash (*Hibiscus sabdariffa* L.) 20%, 40%, 60%, and chlorhexidine.

Table 3. Statistical Difference Test each Group Treatment Using Post Hoc Test

Treatment Group A Against Group B treatment		Sig.
Aquades	Chlorhexidine	0.000*
	Flower Extract Roselle 20%	0.043*
	Flower Extract Rosella 40%	0.001*
	Flower Extract Roselle 60%	0.000*
Chlorhexidi ne	Aquades	0.000*
	Flower Extract Roselle 20%	0.000*
	Flower Extract Rosella 40%	0.000*
	Flower Extract	0.015*
Treatment Group A Against Group B treatment		Sig.
Aquades	Chlorhexidine	0.000*
	Flower Extract Roselle 20%	0.043*

	Flower Extract Rosella 40%	0.001*
	Flower Extract Roselle 60%	0.000*
Chlorhexidine	Aquades	0.000*
	Flower Extract Roselle 20%	0.000*
	Flower Extract Rosella 40%	0.000*
	Flower Extract	0.015*

Based on table 5.3, it can be seen that there is a significant difference in the average increase in salivary pH between the group rinsing with chlorhexidine as a positive control (standard drug) and the group rinsing with rosella flower extract mouthwash 20%, 40%, 60%, and the group distilled water with $p < 0.05$, which means that the effectiveness of rosella flower extract mouthwash at concentrations of 20%, 40%, and 60% is lower than the effectiveness of chlorhexidine in increasing salivary pH. Among the groups that rinsed their mouths with rosella flower extract, there was no significant difference between the groups the 20% extract and the 40% group, however, were significantly different when compared to the 60% extract in increasing salivary pH.

DISCUSSIONS

The active substances contained in rosella flower extract at various concentrations can produce anti-bacterial effects (Riwandy et.al., 2014). This antibacterial effect is one of the factors increasing the pH of saliva in the oral cavity, as shown in table 5.1, namely the average salivary pH before and after for the group that rinsed using 20% Rosella flower extract mouthwash, namely 6.955 increased to 6.985, then the drug group 40% rosella flower extract mouthwash, namely 6.68, increased to 7.275, and for the group rinsing with 60% rosella flower extract mouthwash, namely 6.275 increased to 7.45, for the chlorhexidine group, namely 6.495, increased to 7.25, while for the Aquades group experienced a decrease in salivary pH from 6.745 to 6.725, this is because distilled water is an active substance that has no effect on salivary pH. The increase in salivary pH that occurs in Rosella flower extract mouthwash is due to the polyphenol content as an antibacterial, so this content can affect bacteria that ferment carbohydrates into acid (Zulfikri, Fiki, 2019).

As for the mouthwash chlorhexidine experienced an increase in salivary pH because chlorhexidine belongs to the bisguanide group in the form of gluconate as an ingredient that has an antimicrobial effect so that it can attack gram-positive and gram-negative bacteria (Fajrin, 2019). The One Way Anova test as seen from table 5.3 shows that the P value < 0.005 , meaning that there is a

significant difference in the average rinsing with rosella flower extract mouthwash (*Hibiscus Sabdariffa* L.) and Chlorhexidine on salivary pH. Post Hoc test results showed that the group rinsing with chlorhexidine had higher mouthwash effectiveness than the group rinsing with rosella flower extract 20%, 40%, 60%, and Aquades, but there was no significant difference between the groups 20 rosella flower extract mouthwash. % and 40%, but different from the 60% rosella flower extract mouthwash group in increasing salivary pH.

When seen from table 5.1, the 60% rosella flower extract mouthwash group had a higher salivary pH than chlorhexidine. This was also supported by the research of Ratnasari Dyah (2015) who stated that from the results of research on the growth of *Streptococcus mutans*, rosella flower extract concentration of 70 % has a larger diameter of the inhibition zone than chlorhexidine. Based on the results of the study, it can be concluded that there are significant differences in rinsing with rosella flower extract mouthwash 20%, 40%, 60%, and chlorhexidine in increasing salivary pH, so rosella flower extract mouthwash 20%, 40%, and 60% can be used as an alternative mouthwash in increasing the pH of saliva in the oral cavity.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the research and discussion regarding the Comparison of the Effect of Rosella Flower Extract Mouthwash (*Hibiscus Sabdariffa* L.) and Chlorhexidine on Saliva pH of Students of Dental Health Major, health polytechnic of the ministry of health Palembang, conclusions can be drawn as follows:

1. The average salivary pH of students majoring in dental health at the Poltekkes Kemenkes Palembang before rinsing with Rosella flower extract mouthwash (*Hibiscus sabdariffa* L.) concentrations of 20%, 40%, 60%, and chlorhexidine, namely the group gargling with Chlorhexidine mouthwash, was 6.945, for the group gargling with 20% Rosella flower extract mouthwash is 6.995, then the 40% Rosella flower extract mouthwash group is 6.68, and for the group rinsing with 60% Rosella flower extract mouthwash is 6.275.
2. The average salivary pH of students majoring in dental health at the Poltekkes Kemenkes Palembang before rinsing with mouthwash with Rosella flower extract (*Hibiscus sabdariffa* L.) concentrations of 20%, 40%, 60%, and chlorhexidine, namely for the Chlorhexidine group, 7.25, for the mouthwash group Rosella flower extract 20% is 6.985, then for the 40% Rosella flower extract mouthwash group is 7.275, and for the Rosella flower extract mouthwash group 60% is 7.45.
3. The average difference in salivary pH of students majoring in dental health at the Poltekkes Kemenkes Palembang before and after rinsing with Rosella flower extract mouthwash (*Hibiscus sabdariffa* L.) concentrations of 20%, 40%, 60%, and chlorhexidine, namely for the Chlorhexidine group, 0.755, for the drug group 20% Rosella flower extract mouthwash is 0.03, then for the

40% Rosella flower extract mouthwash group is 0.595, and for the 60% Rosella flower extract mouthwash group is 0.755.

4. Rosella flower extract mouthwash 20%, 40%, 60% can increase salivary pH, however rosella flower extract mouthwash 20% and 40% increase salivary pH less than rosella flower extract mouthwash 60%.
5. Effectiveness in increasing salivary pH, rosella flower extract mouthwash 60% significantly stronger than Chlorhexidine mouthwash, this was shown in the test statistic 0.015

Based on the results of the research that has been done, the researcher provides suggestions, as follows:

1. To get the effectiveness of rosella flower extract mouthwash, the researchers suggested increasing the concentration of the mouthwash.
2. Researchers suggest further research on the effect of gargling with Rosella flower extract mouthwash 20%, 40%, 60% on salivary pH with a longer use of mouthwash.

FURTHER STUDY

Thus, it was concluded that the effectiveness of 60% rosella flower extract mouthwash was significantly stronger in increasing salivary pH than Chlorhexidine mouthwash, this was shown in statistical test. One way to control the degree of acidity (pH) of saliva is the use of mouthwash. The Indonesian government has supported the use of traditional mouthwash as an alternative way, this is aimed to provide dental health services in Indonesia, and also because Indonesia is a country with various types of plants that are very useful for health. The herbal plants that have antibacterial benefits are Rosella flowers (*Hibiscus sabdariffa* L.). With the antibacterial effect, rosella flower extract (*Hibiscus Sabdariffa* L.) can be used as a traditional mouthwash.

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