

The Effect of Anchovy *Stelophorus commersonii* on Salivary Mutans Streptococci

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ABSTRACT

Objectives: A clinical trial was carried out to investigate the inhibitory effect of Anchovy of *Stelophorus commersonii* on the growth of salivary mutans streptococci over one week period. **Methods:** Before enrolled in the study, respondents filled and signed the informed consent. Twenty respondents participated in the study I, conducting two times of treatment as follows: twenty as treatment group before and after consuming anchovy of *commersonii* and the twenty subjects as control group before and after consuming non-anchovy of *commersonii*. Saliva samples were collected before and after consuming anchovy of *commersonii* and with a non-anchovy of *commersonii*. A serial dilution was made, followed by inoculating on TYS20B medium (Schaeken., et al,1986). Data were obtained from colony forming units of salivary mutans streptococci grew on the TYS20B medium before and after consuming anchovy of *commersonii* were analyzed in a descriptive and t test. **Results:** showed that there was no significant different in the average amount of *Streptococcus mutans* both between before and after consuming non-anchovy of *commersonii*. However, a significant difference was found respectively as results before and after consuming anchovy of *commersonii*. **Conclusion:** Anchovy of *commersonii* has an anti microbial activity against local strains of S.mutans isolated from human harbouring species. Long term consummation Anchovy fish of comersonii, can be beneficial in preventing caries.

Key words: Anchovy of *Stelophorus comersonii* - Salivary Mutans Streptococci.

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INTRODUCTION

Streptococcus mutans harbor in the dental plaque is thought to be the main agent to caries prevalence. Acidogenicity and aciduricity are important biochemical characteristics for cariogenicity of microorganisms. The mutans streptococci have both of these properties and considered the most cariogenic group within the oral micro flora.^{1,2}

For this reason early prevention is needed to maintain the oral health by rinsing through using mouthwash and tooth brushing. It is the most widely used and socially accepted form of oral hygiene.³ Mouth rinsing and tooth brushing are the principal way for mechanical removal of plaque and to prevent *Streptococcus mutans* colonized in teeth.^{3,4}

Anchovy fish of *commersonii*, contains nutritional contents of carbohydrates, proteins, fats, vitamins and minerals. One of the important nutritional element in Anchovy fish is fluoride. The fluoride level in this fish is quite high ranging from 5 to 35 ppm, thereby anticipating that oral health is maintained by regularly consuming Anchovy fish.⁵

This research is expected to contribute significantly to the world of science that Anchovy substrate of *commersonii* can inhibit the bacterial growth of mutans of *Streptococci mutans*, therefore in a long term of consuming Anchovy fish of *comersonii*, caries can be prevented.

MATERIALS AND METHODS

The research was done by using Quasi experimental laboratory method in human with epidemiological approach. The bacteria used as analysis unit were local strains of mutans of *S.mutans* isolated from human harbouring species in Panggang Island Indonesia.

Twenty subjects participated conducting two times treatment as treated and also as control group. The subjects participated in this study had a good oral health, no evidence of progressive periodontal diseases and no untreated caries.

The analyzed unit was mutans of *S.mutans* in saliva. Mutans of *S.mutans* are cultivated in Tryptose - Yeast Sucrose with Bacitracin (TYS20B)⁸. Brain Heart Infusion Broth(BHI) was performed. Those specimen were incubated in anaerobic jar at 37⁰ C for 3 X 24 hours.

Respondents were examined their oral hygiene, their oral hygiene shall be on average. Respondents filled and sign the informed consent.

Before and after consuming non-anchovy of *Stolephorus commersonii* and anchovy of *Stolephorus commersonii*. Respondents chewed sterile paraffin to obtain considerable amount of saliva. Two hours after consuming anchovy, saliva are collected.

The saliva samples, then make a serial dilution. 1 ml of saliva is diluted with 9 ml sterile saline to make a serial dilution and from the tube of 1000 fold dilution, is then take 0.1 ml of solution to inoculate in the selective medium of TYS20B (Schaeken *et al*, 1986)⁶. All samples were incubated in anaerobic jar at temperature of 37° C for 3 X 24 hours.

Subjects were treated with consuming anchovy of *Stolephorus commersonii* and non-anchovy of *Stolephorus commersonii*, 3 X 50 gram anchovy daily for a period of one week consumption.

The Colony Forming Units (CFU) of *Streptococcus mutans* which grew in the TYS20B medium are then counted and recorded.

Data which were obtained from colony forming units of salivary mutans streptococci grew in TYS20B medium before and after treatment were analyzed in a descriptive and "t" test

RESULTS

The results of analyzed colony forming units (CFU) amount of *Streptococcus mutans* which grew on TYS20B media before and after consuming with anchovy and non-anchovy of *Stolephorus commersonii* are shown in the Table 1.

Table 1. Mean and standard deviation (SD) of CFU *Streptococcus mutans* on treatment with anchovy and non-anchovy of *Stolephorus commersonii*

N=20	Mean	SD
Before - non anchovy	410.50	234.90
After - non anchovy	387.00	326.12
Before - anchovy	381.75	315.91
After - anchovy	84.25	80.08

Table 1 shows that CFU of *S.mutans* after consuming the anchovy of *Stolephorus commersonii* (X=84.25 +/-SD = 80.08) is lower than before consuming the anchovy of *Stolephorus commersonii* (X=381.75 +/-SD=315.91). The CFU of *S.mutans* after consuming the anchovy of *Stolephorus commersonii* (X=84.25 +/- SD = 80.08) is also lower than after consuming the non - anchovy of *Stolephorus commersonii* (X=387.00 +/- SD= 326.12).

The significance of the effectiveness of anchovy of *Stolephorus commersonii* was done by a "t" test analysis and the results can be seen in the table 2. Significant level was accepted when p-level at 5 % was lower than 0.05(p<0.05).

Table 2. "t" test on treatment with xylitol chewing gum and non-xylitol

Difference of treatment	Df	t	p	Significance
Before-After Consuming (non-anchovy)	18	0.285	0.946	P<0.05
Before-After Consuming (anchovy)	18	3.560	0.005	P<0.05
Before chewing (non-xylitol - xylitol)	18	0.440	0.800	P<0.05
After chewing (non-xylitol - xylitol)	18	2.780	0.010	P<0.05

No significant difference was found between the CFU of *S. mutans* before and after consuming the non-anchovy of *Stolephorus*

commersonii, where p-level at 5% was 0.946 and t-value was 0.295.

As expected the amount of CFU salivary mutans streptococci showed very significant difference the CFU of *S.mutans* before and after consuming with anchovy of *Stolephorus commersonii*, where p-level at 5% was 3.560 and t-value was 0.005. When CFU of *S.mutans* before and after consuming with non-anchovy of *Stolephorus commersonii* compare to before consuming with anchovy of *Stolephorus commersonii* the t-value 0.440 where p-level at 5% was 0.800 meaning that there is no significant difference.

After consuming the non – anchovy of *Stolephorus commersonii* compared to after consuming with anchovy of *Stolephorus commersonii* also showed significant difference (t-value was 2.780 where p-level at 5% was 0.010)

DISCUSSION

The results in table 1 shows that the amount of CFU of *Streptococcus mutans* after consuming the anchovy of *Stolephorus commersonii* is lower than the amount of CFU of *Streptococcus mutans* after consuming the non – anchovy of *Stolephorus commersonii*.

After consuming non-anchovy of *Stolephorus commersonii* the CFU of *Streptococcus mutans* is decreased compare to the CFU of *Streptococcus mutans* before consuming the non - anchovy of *Stolephorus commersonii*.

The results from table 2 showed that where was highly significance difference in the average amount of *Streptococcus mutans* colonies between before and after consuming with anchovy of *Stolephorus commersonii*.

In the past study it had been proven that Anchovy substrate of *Stolephorus commersonii* has anti microbial activity against standard strains of *Streptococcus mutans* LM 7, *Streptococcus mutans* JC 2, *Streptococcus mutans* KPSK2 *Streptococcus mutans* Ing Britt and *Streptococcus sobrinus* B13⁷ and local strains of mutans of *Streptococcus mutans* isolated from human harbouring species⁸.

In Indonesia, dental caries is still a big problem in the dentistry, although efforts to overcome it have been made, such as by using fluoridation method, which can be systemic and topical application.

However considering the very small need of systemic fluoride by human beings, i.e about 1.7–3.3 ppm daily, it is very difficult to determine the concentration of ionic fluoride which should be given to the people, because of the harmful side effect of systemic fluoride administration, so this method is already left out.

Thus we carried out another method of topical fluoridation among others by chewing food, before it swallowed, which is rich in fluoride, i.e anchovy *Stolephorus commersonii*, that has fluoride property about 5 – 35 ppm.⁵

CONCLUSION

The research showed that commersons anchovy has bactericide activity on mutans of *Streptococcus mutans*. Commersons anchovy of *Stelophorus commersonii* is traditional food for the population along the coast of Indonesia.

Because Commersons anchovy contains high fluoride ion, it also can be used as a topical application, so early risk of caries can be anticipated, by in a long term of consuming Anchovy fish of *Stelophorus commersonii*, caries can be prevented.

REFERENCES

1. Bratthall D. Demonstration of five serological groups of streptococcal strains resembling *Streptococcus mutans*. *Odontol Revy* 1970. 21: 143-152
2. Emilson CG, Lindquist B and Krasse .B. Colonization pattern of two serotypes of mutans streptococci implanted in human. *Caries Res* 1989. 23; 94
3. Newbrun E. *Cariology* 3th ed Quintessence Publishing Co. Inc 1989: 148-50
4. Erickson L. Oral health promotion and prevention for older adult . *J Dent Clinics of North America* .October 1997; 41(4):731
5. Ayu Wulandary, Harun A Gunawan. The analysis of fluoride compound in dried anchovy and in the enamel after application with commersons anchovy substrate. Student 's Dissertation of the Faculty of Dentistry University of Indonesia 2004
6. Schaeken MJM, van der Hoeven JS, Franken HCM. Comparative recovery of *Streptococcus mutans* on five isolation media including a new simple selective medium. *J Dent Res.* 1986; 65:906-8
7. Mangundjaja S, Yuni A, Andy S. In Vitro Anti Microbial Activity of Anchovy Substrate of *Stolephorus commersonii* on Mutans Streptococci. Paper read at the International Meeting on Dentistry for the Nano- Informatic- Genomic-Technology Era and The 7th Thai Dental Faculties Board Scientific Meeting. February 2-4, 2005 Sofitel Raja Orchid ,Khon Kaen Thailand
8. Soekanto SA.,and Mangundjaja. Effect of Anchovy Substrate of *Stelophorus commersonii* on Mutans of *Streptococcus mutans* Isolated from Human Harboring Species in Bangka Island Indonesia. Paper read at the 4th Indonesian Association for Pediatric Dentistry Meeting 8 - 9 April, 2005 at University of Pajajaran Bandung Indonesia