

Utilization of Chlorine Dioxide Solution to Prevent Halitosis Due to Coated Tongue

Suci Erawati, Mangatas H. P., Laras P.
Faculty of Dentistry, Universitas Prima Indonesia, Indonesia

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Abstract: Halitosis is a characteristic of unpleasant odors arising from the oral cavity and causing disruption in one's life. The source of halitosis can come from the oral cavity (intra oral) or from outside the mouth (extra oral). One of the causes of intra-oral is coated tongue which is a condition where the surface of the tongue in white or other colored which is a pile of debris, food debris, and microorganisms attached to the dorsum surface of the tongue. Chlorine dioxide is a powerful oxidizing agent and is effective for killing bacteria. This research was an experimental method with pre and post test with control group design using 30 female subjects with complaints of halitosis. The results showed that after gargling for 10 days, found 76.7% subjects without coated tongue and 100% mild halitosis subjects became normal.

1 INTRODUCTION

Halitosis or in other terms feor ex ore, bad or foul breath is a characteristic of unpleasant odors arising from the oral cavity. The cause of halitosis can come from inside the oral cavity and from outside the oral cavity. The cause of the oral cavity is usually due to poor oral hygiene care, deep caries, periodontal disease, oral cavity infection, dry mouth, smoking, mucosal ulceration, pericoronitis, food scraps in the mouth and Coated Tongue.10.19.20. The main component of gas compounds in halitosis is Volatile sulfur compounds (VSCs). Halitosis is one of the bad breath disorders that has a negative impact on a person's life, including causing poor communication, low self-esteem, shame, difficulty interacting socially, disturbing people around (Alsheri, 2016; Ashwath, 2014).

One of the conditions that can be found in almost everyone is the condition of coated tongue 3. In the initial research conducted at Ujung Berung Health Center in Bandung in 2016 showed that the condition of coated tongue is the most common oral lesions found in all groups 4. Coated Tongue is one of the factors important thing that can cause halitosis. The dominant development in anaerobic microbes associated with coated tongue has been considered as an ideal microenvironment to produce foul-smelling compounds. Therefore the relationship between Coated Tongue and halitosis was assessed and evaluated through patients who visited the clinic with

complaints of halitosis consisting of 51% due to Coated Tongue, 17% gingivitis, 15% periodontitis and 17% combination.

The results of a 2017 study showed that students with coated tongue were 2.75 times more likely to have halitosis compared to those who did not have a coated tongue. The relationship between Coated Tongue and halitosis complaints has also been observed in populations in Thailand (Casemiro, 2008; Aydin, 2014).

Most people today need a fast and efficient way to reduce halitosis to be more confident. There are many ways to deal with halitosis, one way is to use mouthwash. Mouthwash containing essential oils, triclosan, cetylpridinium chloride, and Chlorine Dioxide (ClO₂) has clearly proven effective in reducing bad breath. The use of mouthwash is a simple effort to overcome halitosis. In Indonesia, the market offers a variety of brands with different active ingredients than mouthwash (Poetry et al,2018; Aydin, 2014; Erawati, 2014; Sun Choi, 2020; Turnip, 2020; Wijaya, 2019).

Chlorine Dioxide is a powerful and effective oxidizing agent to kill bacteria, viruses, and fungi in an acidic environment. At low concentrations ClO₂ is effective in reducing VSC which causes bad breath. This can inhibit the growth of microorganisms by disrupting the transportation of nutrients throughout the cell membrane. ClO₂ oxidatively activates salivary biomolecules including pyruvate methionine, trimethylarine, tyrosain 'and glycine so

as to direct its anti-microbial effects (Poetry et al, 2018; Sun Choi, 2020; Chen, 2016; Dwirassa, 2016; Nazir, 2017).

2 METHOD

This research has been completed with the approval of the Health Research Ethics Commission (KEPK) of Prima Indonesia University No: 002 / KEPK / UNPRI / III / 2019. This type of research is an experimental study using a pretest and post test design approach that is by measuring or observing before and after the treatment is given. The population in this study was 90 mothers with a large sample of 30 people obtained using the proportion research formula. The tools used are as follows: Sheet sheet of subject selection form, Breathon II measuring instrument, gloves / hand scoon, mask, flashlight, tissue, stationery. The ingredients used are chlorindioxide mouthwash, distilled water / mineral water, anti-septic soap.

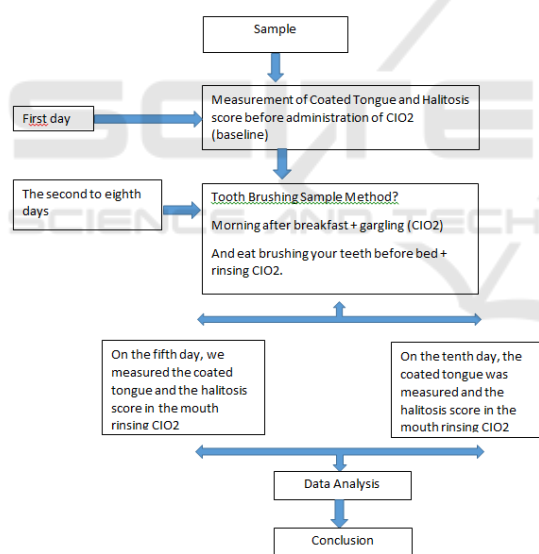


Figure 1: Scheme of research process

The research stage was to conduct screening to determine the subject by means of examination in accordance with inclusion and exclusion criteria. Each subject agrees, the subject can sign the Informed Consent. Then the coated tongue and halitosis scores were measured in the subjects before being treated (first day). Clinical examination of the tongue to measure the score for the coated tongue on the surface of the tongue by sticking out the tongue. Then proceed with the examination of the VSC gas score

which causes bad breath (halitosis) using the Breathon II device, the next day (second to ten days) the subject is given mouthwash (ClO₂) and must be used for ten consecutive days with a dose of 10 ml liters. twice a day, morning after breakfast and night brushing. There are no specific rules in the use of the method of brushing teeth or the toothpaste used. Subjects rinsed for one to two minutes, on day five and day ten subjects had to follow the instructions of the investigator to measure the coated tongue and halitosis scores to determine the difference before and after using chlorine dioxide mouthwash.

3 RESULTS

The distribution of sample characteristics based on age can be seen in full in Table 1.

Table 1. Distribution of sample characteristics by age

Age (Years)	N	Percentage (%)
30-33	3	10,0
34-37	0	0,0
38-41	7	23,3
42-45	9	30,0
46-49	6	20,0
50	5	16,7
Total	30	100,0

Based on the results of the study, on the first day, 20 samples (66.7%) had coated tongue with thick membranes. Meanwhile, 10 samples with thin-coated coated tongue (33.3%). On the fifth day, there were 8 people (26.7%) who experienced coated tongue with thick membranes while 17 people (56.7%) had thin-coated coated tongue (16.7%) and 5 people (16.7%) were absent. samples with thick coated tongue (0%). The thin membrane of 7 people (23.33%) and no membrane 23 people (76.67%) is seen in Table 2.

Distribution of samples with mild halitosis on the first day 28 people (93.3%) moderate halitosis 2 people (6.7%) on the fifth day, 30 people did not experience halitosis (100%) and on the tenth day of the entire sample, 30 people did not experience halitosis (100%) this is shown in Table 3.

Table 2: Distribution of samples experiencing coated tongue on the first fifth to tenth

Days	Coated Tongue					
	No Membrane		Thin membrane		Thick membrane	
	n	%	N	%	n	%
1	0	0,0	10	33,3	20	66,7
5	5	0	17	56,7	8	26,7
10	23	16	7	23,3	0	0,0

Table 3. The distribution of sample frequencies experiencing normal, mild and moderate halitosis

Days	Halitosis					
	Normal		Light		Medium	
	N	%	n	%	n	%
1	0	0,00	28	93,3	2	6,7
5	30	100,00	0	0,00	0	0,00
10	30	100,00	0	0,00	0	0,00

The average halitosis score of the sample after rinsing with CIO2 solution on the first day was 163, 77 + 54,957, on the fifth day there was a decrease in the halitosis score in the sample to 59, 80 + 27.95, and on the tenth day the average halitosis score in the sample decreasing to 36.17 + 12,152 can be seen in Table 4.

Table 4. Average halitosis scores of samples on the first, fifth, and tenth days.

Gargle treatment Solution (C IO2)	X + SD
Day 1	163, 77 +54,9573
Day 5	59, 80 + 27,95
Day 10	36,17 + 12,152

The difference in the mean halitosis scores of the samples after rinsing with CIO2 solution on the fifth day was 93.97 + 27.862, while the average difference in halitosis scores after rinsing CIO2 solution on the tenth day was 127.60 + 42,805. The results of statistical tests showed that there was a significant difference between day five and day ten $p = 0.00$ ($p < 0.05$). Can be seen in table 5.

Table 5. The difference in the average halitosis difference of samples after rinsing with CIO2 solution on the fifth and tenth day (n = 30).

Difference in average halitosis scores	X + SD	P
Day 5	93,97+ 27,862	0,000
Day 10	127,60+42,805	

4 DISCUSSIONS

Oral disease affects humans in almost all over the world, including Indonesia, and almost reaches 50% of the total adult population. One condition that can be found in almost everyone is coated tongue. One of the important factors that can cause halitosis. The dominant development in anaerobic microbes associated with coated tongue is considered to be the ideal microenvironment to produce foul smelling compounds (Poetry et al, 2018; Nazir et al, 2017).

The results showed that before rinsing with chlorine dioxide, twenty out of thirty had thick-filmed coated tongue (66.7%) and twenty-eight out of thirty respondents had mild halitosis (93.3%). After rinsing with mouthwash containing (CIO2) for ten consecutive days (posttest), twenty-three out of thirty respondents on coated tongue had no membranes (76.7%) and overall normal halitosis (100%). The results showed that the average coated tongue score index on the first day was 1.67 ± 0.479 , the fifth day was 1.10 ± 0.662 and on the tenth day was 0.23 ± 0.430 which indicated that there was a significant difference in the mean coated score. tongue, namely with a p value of 0.000 (< 0.05) (Poetry et al, 2018; Nazir et al, 2017; Pangesti, 2014).

Likewise with the results of research on halitosis, it was found that respondents on the first day were in the halitosis parameter based on a mild VSC gas score of 110-239 ppb and moderate halitosis of 351 ppb and 277 ppb with mean values of 163.77 ± 54.957 . Halitosis on the fifth day of all respondents was in the halitosis parameter based on the normal VSC gas score, namely 13-18 ppb with a mean of 59.80 ± 27.095 as well as halitosis on the tenth day with a mean of 59.80 ± 27.095 as well as halitosis on the tenth day where the overall the respondent is in the parameter. Halitosis based on the normal VSC gas score is 19-82 ppb with a mean of 36.17 ± 12.152 . From these data it can also be concluded that the use of CIO2 mouthwash in dealing with coated tongue is more effective on the tenth (pottest) day, this statement is in line with the research conducted by Shinada et al., (2010) which was conducted on 15 healthy adult men aged 19- 83 years of age proven to be effective in eliminating bad breath (halitosis), plaque and coated tongue on the seventh day of mouthwash (pottest) use (Nazir et al, 2017; Pangesti, 2014; Sun Choi, 2020).

From the results of the study it can be concluded that the decrease in the coated tongue score also has an impact on the decrease in the halitosis score, which is significant, which can be seen in the bar graph in the image. In line with the results of research from

Lawande (2013) that there is a relationship between coated tongue and halitosis. Likewise, the results of research conducted by Jui-Wei-Ma, et al., (2017) also stated the same results that there was a correlation between Coated Tongue and halitosis (Pangesti, 2014; Sun Choi, 2020; Jui, 2017).

5 DISCUSSIONS

- There was a significant effect on the use of chlorine dioxide mouthwash on the conditions of coated tongue causing halitosis in respondents (p value = $0.000 < 0.05$).
- The average index score for coated tongue on day 1, day 5 and day 10 was $1.67 + 0.662; 0.23 + 0.430$, which indicates that there is a significant difference of p $0.000 (< 0.05)$ on the average index score of coated tongue among respondents.
- Average halitosis parameters based on VSC gas on day 1 $163,77 + 54,957$, day 5 ($59,80 + 27,095$), and day 10 ($36,17 + 12,152$) which indicated that there was a significant difference p $0,000 (< 0.05)$ on the average halitosis parameter based on the VSC gas score of the respondent.
- The use of chlorine dioxide mouthwash on day 5 was effective, but the reduction in coated tongue and halitosis scores on day 10 was much more effective than on day 5.

6 SUGGESTION

- It is recommended that the public carry out maintenance of oral hygiene, especially the tongue regularly such as brushing teeth, brushing the tongue and rinsing with a mouthwash solution, and it is also recommended to routinely have their teeth and mouth checked by the dentist to create a clean and healthy oral cavity condition so as to avoid coated tongue and bad breath.
- It is recommended that the public use chlorine dioxide mouthwash to reduce coated tongue and halitosis in the oral cavity in order to increase self-confidence when communicating with others.
- Use of mouthwash must follow the rules and regulations recommended by dentists, dental nurses or other health professionals. Mouthwash only as a complement or addition

to carrying out oral health care only. Not for continuous treatment because it can kill normal flora in the oral cavity.

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