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An Analysis of Predisposition Factors of Coated Tongue in Diponegoro National Hospital

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ABSTRACT

An Analysis of Predisposition Factors of Coated Tongue in Diponegoro National Hospital

Background: Several results of the study in Indonesia show that the age group of >45 years old has complaints of the coated tongue as the lesion with the highest percentage in the oral cavity. This occurs because the change of condition is influenced by the change of foods consumed, a decrease of saliva flow rate, and can be occurred due to the side effect of consuming antihypertensive drugs, smoking habits, and tongue brushing behavior. **Objective**: This study aims to find out the relationship between predisposition factors and coated tongue and find out the most contributing factors to coated tongue in the age group of >45 years old in Diponegoro National Hospital (RSND). **Methods**: This study used a cross-sectional design with 84 respondents of >45 years old in internal medicine polyclinic. This study was conducted by interviews of predisposition factors and TCI Shimizu for the assessment of coated tongue. The statistical test used the chi-square test and logistic regression test. **Results**: Respondents with a TCI value of >50% were 97.6%, and a TCI value of ≤50% were 2.4%. Chi-square test showed that there is a relationship between coated tongue and xerostomia (P=0.034), brushing the tongue (P=0.001). However, there is no relationship between coated tongue and smoking (P=1.000), consuming antihypertensive drugs (P=1.000), consuming soft food (P=0.495). The results of the logistic regression test showed that xerostomia and brushing the tongue do not affect the coated tongue partially (P=0.997).

Conclusion: There is a relationship between xerostomia and brushing the tongue with coated tongue. There is no partial effect between xerostomia and brushing the tongue with coated tongue.

Introduction

Signs of aging will generally appear at 45 years old and will cause problems in 60 years old. This is caused by the loss of the ability to function of organ systems normally due to the progressive physiological and anatomical changes.[1] Complaints in the oral cavity frequently experienced by the age group of >45 years old are tooth decay, tooth loss, and soft-tissue abnormalities due to the changes in the structure of mucosal tissue.[2] Several results of the study in Indonesia show that the age group of >45 years old has complaints of the coated tongue as the lesion with the highest percentage in the oral cavity.[3,4] Coated tongue is a condition where the dorsal surface of the tongue is covered by white, yellow, or other colored layers depends on the pigmentation resulted from bacteria with varying

thickness. The layer is formed due to accumulated plaque from food debris, bacteria, and desquamated epithelium.[5] The condition of the coated tongue is often experienced by the age group of >45 years old compared to young adults. This occurs because the change of condition is influenced by the change of foods consumed, a decrease of saliva flow rate, and can be occurred due to the side effect of consuming antihypertensive drugs, smoking habits, and tongue brushing behavior.[6]

Ogami stated that there is a relationship between coated tongue and consuming soft food because it is easy to settle on the surface of the tongue. This study shows that respondents who received dental and oral health care have fewer complaints of the coated tongue.[7] The habit of brushing the tongue, according to the study by Hamid, shows that the use of a tongue scraper can decrease the thickness of coated tongue.[8] The smoking activity in the study

by Melinder shows that 55 out of 68 smokers have coated tongue.[9] This condition is caused by the side effect of smoking in the form of a decrease in the salivary rate.[10] Xerostomia condition caused by physiological changes, side effects of antihypertensive drugs, and smoking cause the oral cavity to be dry and prone to irritation. A study by Hajin stated that there is a thin layer on the surface of the tongue in people with xerostomia.[11] This condition causes a decrease in the role of saliva and triggers the coated tongue.

Based on the explanation above, this study aims to find out the relationship between predisposition factors and coated tongue and to find out the most contributing factors to the coated tongue in RSND using Tongue Coating Index developed by Shimizu.

Material and method

with 84 respondents of >45 years old in internal medicine polyclinic of RSND. The respondents who met the inclusion criteria are: do not have symptoms of pain/burning on the tongue surface, be willing to be the subject of the study, be able to open the mouth and stick out the tongue properly. The sampling was conducted by consecutive sampling. This study has obtained ethical approval from the Health Research Ethics Committee of Faculty of Medicine Diponegoro University No. 247/EC/KEPK/FK- UNDIP/XI/2020 and recommendation of a research permit in Diponegoro National Hospital No. 230/ UN7.9/PP/2021.

This study was conducted by interview regarding predisposition factors of the coated tongue, which consist of smoking, consuming antihypertensive drugs, xerostomia,

consuming soft food, and brushing the tongue behavior. Taking a picture of the tongue surface was conducted to have a final score assessment of coated tongue using the Shimizu index. The assessment of coated tongue was performed by dividing the picture of the dorsal surface of the tongue into nine parts. Each part has assessed the coated tongue with the assessment criteria: score 0 (coated tongue not visible), score 1 (coated tongue thin, papillae of tongue visible), score 2 (coated tongue thick so that the papillae not visible). The results of the score were recorded on Tongue Coating Record (TCR). The final score of TCI was divided into two, 1 if the TCI score ≤50% and 2 if the TCI score >50%. [12]

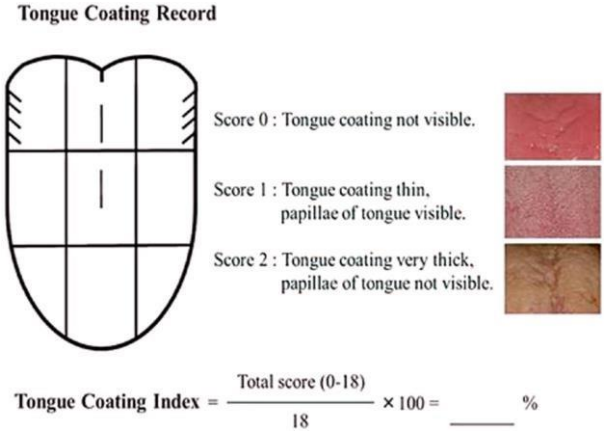

Figure 1. Tongue coating record (Shimizu) [12]

The relationship between predisposition factors and coated tongue was tested by chi-square test/ alternative fisher's exact test if the requirements of chi-square test are not met. The influence of predisposition factors on the coated tongue was tested by a logistic regression test. The test was performed with the significance value of $P<0.05$.

Result and discussion

Table 1 shows that the respondents of 45-59 years old are 41 respondents (48.8%), 60-74 years old of 41 respondents (48.8%), and 75-89 years old of 2 respondents (2.4%). 82 (97.6%) respondents have the coated tongue value of >50% and 2 respondents (2.4%) of ≤ 50%. 7 respondents (8.3%) have smoking activity, and 77 respondents (91.7%) are not smoking. Respondents who are consuming antihypertensive drugs to reduce high blood pressure are 55 respondents (65.5%), and 29 respondents (34.5%) are not. Xerostomia was felt by 68 respondents (81%), and 16 respondents (19%) are not feel it. 40 respondents (47.6%) have a habit of consuming soft food (chopped/softened) for more than two years, and 44 respondents (52.4%) still consume foods with normal texture. In the activity of brushing the tongue, 10 respondents (11.9%) do the activity routinely, or 2-3 times a day, 11 respondents (13.1%) do not routinely brush the tongue, and 63 respondents (75%) do not brush the tongue.

Table 1. Frequency distribution of respondent characteristics

Variable	N	%
Age		
45-59 years old	41	48,8%
60-74 years old	41	48,8%
75-89 years old	2	2,4%
>90 years old	0	0%
Coated Tongue		
0%	0	0%
≤ 50%	2	2,4%
> 50%	82	97,6%
Smoking		
Yes No	7	8,3%
Consuming	77	91,7%
Antihypertensive		
Yes No		
Xerostomia Yes No	55	65,5%
Soft food	29	34,5%
Yes No		
Brushing tongue	68	81%
Routine Not routine	16	19%
No		
	40	47,6%
	44	52,4%
	10	11,9%
	11	13,1%
	63	75%

A coated tongue is a condition where the dorsal surface of the tongue is covered by a layer formed as a result of plaque from food debris, bacteria, and desquamated epithelium. This layer has varying thickness and color.[6] This study found that 84 respondents experience coated tongue, with 82 (97.6%) respondents have a score of 2 and 2 (2.4%) respondents have a score of 1. In the previous study conducted by Widayagdo, the oral cavity condition of 30 respondents visited in Puskesmas (Community Health Center) of 30 age group above 45 years old had coated tongue.[3] In the study by Omor, there is a relationship between the high prevalence of coated tongue and an increase in age, with the distribution of coated tongue in the age group of <45 years old is 16.1% and >45 years old is 31.8%.[13] This condition shows that the oral health in the age group of above 45 years old is still low. This can occur because of the decrease of ability in maintaining oral hygiene, physiological changes such as xerostomia, and consuming soft food due to the loss of teeth.

Table 2 shows the data of smoking activity with the coated tongue P=1.000, which shows no relationship between smoking activity and coated tongue.

Table 2. The relationship between smoking and coated Tongue

Coated tongue	Smoking				*P*
	Yes		No		
	N	%	N	%	
0%	0	0%	0	0%	
≤ 50%	0	0%	2	2,4%	1,000
> 50%	7	8,3%	75	89,3%	
Total	7	8,3%	77	91,7%	

Table 2 shows that there is no relationship between the smoking habit and coated tongue. This result is different from the study by Avcu, which shows the significant relationship between smoking habit and coated tongue (P=0.001).[14] The study by Singh shows the meaningful relationship between the smoking habit on 68 men respondents and coated tongue (P=0.001).[9] This study obtained 77 respondents who are not smoking, and 7 respondents are smoking. Based on the Data of Central Java Central Bureau of Statistics in 2019, the prevalence of people who are smoking in the age group of above 45 years old (79.02%) is lower than 15-44 years old (84.45%).[15] This shows that the age is getting old, a person will reduce smoking behavior because of the awareness or have experienced the effects of smoking such as lung cancer and heart disease.[16]

Table 3 shows the data of consuming antihypertensive drugs with the coated tongue (P=1.000), which shows no relationship between consuming antihypertensive drugs and coated tongue.

Table 3. The relationship between consuming antihypertensive drugs and coated tongue

Coated tongue	Antihypertensive				*P*
	Yes		No		
	N	%	N	%	
0%	0	0%	0	0%	
≤ 50%	1	1,2%	1	1,2%	1,000
> 50%	54	64,3%	28	33,3%	
Total	55	65,5%	29	34,5%	

Table 3 shows that there is a relationship between consuming antihypertensive and coated tongue. This is caused by other factors, such as non-hypertensive patients have other chronic disease conditions and consuming other medicines that can cause the hyposalivation conditions.[17] Hyposalivation is one of the oral manifestations that often occurred in patients consuming antihypertensive.[18] The prevalence of group consuming antihypertensive shows that 50% of them have xerostomia due to hyposalivation condition.[19] In the study conducted by Cheng-Yih showed the negative correlation between the number of bacteria and the level of moisture of the tongue surface, or the bacterial growth rate would increase if the moisture level of the tongue is getting lower.[20] Hyposalivation condition can cause the formation of the coated tongue because of the decrease in the role of saliva asa self-cleansing, and cause the increase of microorganisms in the dorsal surface of the tongue.

Table 4 shows the data of xerostomia with coated tongue (P=0.034), which shows a relationship between xerostomia and coated tongue.

Table 4. The relationship between xerostomia and coated Tongue

Coated tongue	Xerostomia				*P*
	Yes		No		
	N	%	N	%	
0%	0	0%	0	0%	
≤ 50%	0	0%	2	2,4%	0,034
> 50%	68	81%	14	16,6%	
Total	68	81%	16	19%	

Table 4 shows the relationship between xerostomia and coated tongue. This is in accordance with the study by Buranarom, which stated that thereis a significant relationship between hyposalivation and coated tongue (P=0.015), and have a negative correlation, which means that the lower the flow rateof saliva, the coated tongue will increase.[21] Santaella argued that the main cause of coated tongueis bad oral hygiene and associated with the decrease of the flow rate of saliva.[22] Generally, xerostomia is caused by hyposalivation and the changes in the composition of saliva, the side effect of using medications, and chronic diseases such as rheumaticor hypertension. Other factors that can cause xerostomia are psychological conditions such as stress and anxiety, malfunctioning of the salivary glands, radiotherapy on the head and neck area.[23]

Table 5 shows the data of consuming soft food with the coated tongue (P=0.495), which shows no relationship between consuming soft food and coated tongue

Table 5. The relationship between soft food and coated tongue

Coated tongue	Soft food				P
	Yes		No		
	N	%	N	%	
0%	0	0%	0	0%	
≤ 50%	0	0%	2	2,4%	0,495
> 50%	40	47,6%	42	50%	
Total	40	47,6%	44	52,4%	

Table 5 shows that there is no relationship between soft-food and coated tongue. This result is different from the study conducted by Sari, which shows a significant negative correlation between the ability to chew and coated tongue (P=0.000). It means that the more decrease the ability to chew withthe increase of age, the coated tongue will increase.[24] This is due to the decrease in the digestive organ, such as the decrease in the ability tochew because of the number of losing teeth and the decreased motor skills due to masticatory muscle atrophy.[25] The study by Ogami stated that there is a significant relationship between the type of foods consumed and coated tongue (P=0.012). Mashed/chopped foods tend to adhesive, which causes the food debris stuck on the tongue papillae. Papillae on the dorsum of the tongue are convex andconcave, which supports the increase of coated tongue from food debris and microorganisms on the surface of the tongue.[7] In this study, 44 respondentsare still able to consume food with normal texture (not mashed/chopped), which shows that several respondents have a good dental condition so that they have a good masticatory function. The examination of the teeth can be performed by the intraoral examination, including the oral hygiene and the health of tissue in the oral cavity, such as teeth decay,teeth loss.

Table 6 shows the data of brushing tongue habit with coated tongue (P=0.001), which shows a relationship between brushing tongue activity and coated tongue.

Table 6. The relationship between tongue brushing and coated tongue

Coated tongue	Tongue brushing						P
	Routine		Not routine		No		
	N	%	n	%	n	%	
0%	0	0%	0	0%	0	0%	0,001
≤ 50%	2	2,4%	0	0%	0	0%	
> 50%	8	9,6%	11	13%	63	75%	
Total	10	12%	11	13%	63	75%	

Table 6 shows the significant relationship between brushing tongue activity and coated tongue.The study by Quirynen showed a significant reduction in the score of the coated tongue before and after the brushing tongue activity routinely for two weeks (P<0.001).[26] Microorganisms in the tonguecan cause the formation of plaque and the occurrenceof the coated tongue. The study by Dwivedi showed a significant change in coated tongue assessment withthe activity before and after brushing the tongue(P=0.001).[27] This shows that brushing tongue activity has an important role in controlling the growth and the number of bacteria that can affect thegrowth of coated tongue. Brushing tongue activity can increase the ability of the sense of taste and decrease the potential for bad breath.[27] The numberof respondents who have brushing the tongue activitywith the coated tongue score of 1 is still low so that the role of medical personnel to improve the quality of life in the age group of over 45 years old is required. The activities carried out are eduction and demonstration on how to maintain oral health.

Variables with a meaningful relationship in this study are xerostomia condition and tongue brushing. In table 7, it is known that the analysis results of the influence of xerostomia and brushing tongue variables on coated tongue show a p-value of 0.997. This shows that xerostomia and brushing the tongue do not influence the coated tongue partially.

Table 7. The influence of predisposition factors to coated tongue

	Variable	*P*
Threshold	Coated tongue	0,995
Location	Xerostomia	0,997
	Tongue brushing	0,997

Brushing the tongue activity should be carried out after brushing the teeth twice a day. The tools thatcan be used to brush the tongue are the brush tonguescraper, metal tongue scraper, and plastic tonguescrapper. [27]

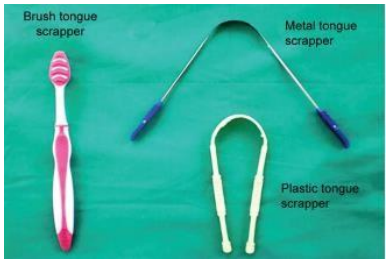

Figure 2. Tongue scrapper [27]

Brushing the tongue activity can be carried out by sticking out the tongue maximally, then use a tongue scraper and put on it to the base of the tongueand apply little pressure until the tongue scraperthoroughly in contact with the tongue. Moreover, pullthe tongue scrapper towards the tip of the tongue slowly, rinse the tongue scrapper using water to remove debris taken from the surface of the tongue. Do the procedures several times until there is no debris on the surface of the tongue, then rinse and drythe tongue scrapper.[28]

The results in table 7 show that xerostomia and brushing tongue partially do not influence the coated tongue. This insignificant result can be caused by multicollinearity. Multicollinearity is a condition where independent variables in the regression equation have a strong correlation with each other. The occurrence of multicollinearity can sometimes be eliminated by increasing the number of samples.[29]

Conclusion

There is a relationship between xerostomia and coated tongue. There is a relationship between brushing tongue habit and coated tongue. Xerostomia and brushing tongue variable partially do not influence the coated tongue.

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