The most common and predicted diagnosis or conditions of oral mucosal lesions among elementary school children

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ABSTRACT

Introduction: Oral mucosal health is part of general health that also requires attention. Research on oral mucosal in children has not widely conducted, especially in the Jatinangor sub-district as one of the educational centres in West Java. This study was aimed to determine the most common and predicted the diagnosis or conditions of oral mucosal lesions among elementary school children. **Methods:** This research was a cross-sectional study. The purposive sampling method was used, in which only the fifth-grade students from the elementary school cluster near the centre of the Jatinangor sub-district were involved. The inclusion criteria were healthy condition, cooperative, able to communicate with the examiner, and obtained permission from the parent/guardian. The oral mucosal lesions were examined using disposable dental tools and a white light headlamp. Oral mucosal lesions found on examination defined as oral diseases and normal variation of oral mucosal. **Results:** A total of 226 students, consisting of 115 males and 111 females, were included in this study. The oral mucosal lesions found were described as follows: 100 cases of pseudomembranous plaque, 106 cases of macula, 56 cases of ulceration, 45 cases of cheek biting, and another fewer lesions. The lesions' diagnosis was coated tongue for the pseudomembranous plaque, physiologic pigmentation for the macula, aphthous stomatitis/traumatic ulcer/angular cheilitis for ulcers, linea alba for cheek biting, and others. **Conclusion:** The most commonly found oral mucosal lesions were macula which is diagnosed as macular hyperpigmentation, followed by pseudomembranous plaque which is diagnosed as coated tongue.

Keywords: children; oral disease; oral mucosal lesion .

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INTRODUCTION

Diseases and conditions of oral mucosal health are a matter of concern as part of general health. The World Health Organization (WHO) defines oral health as a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, masticating, smiling, speaking, and psycho-social wellbeing.[1]

Oral diseases are largely preventable. This condition is prevalent throughout the lifetime but can have adverse effects on individuals, communities, and society.[2] However, the dental professionals and researchers are not focusing their subjects on mucosal diseases and conditions of primary-school-age children, especially in the Jatinangor sub-district, Sumedang, West Java, Indonesia. Jatinangor is one of the central areas of education in West Java, so it is a strategic area to be given intervention in community service activities. The community service activities, in the form of oral mucosal health examinations, as part of dental and oral health examinations, are expected to prevent oral diseases.

For many years, studies on oral conditions focused more on dental caries, as shown in the Indonesia Basic Health Research (Riskesdas), conducted by the Ministry of Health Republic of Indonesia in 2013,[3] that has not been found data of diseases or variations of oral mucosal conditions. From Riskesdas 2018,[4] the data on oral mucosal health have been obtained. In Indonesia, the results stated that the proportion of oral health problems experienced by Indonesians are gingiva edema and/or abscesses (14%), gingiva bleeding (such as when toothbrushing) (13.9%), recurrent (at least four times) ulceration (8%), and persistent (at least one month) ulceration (0.9%).4 Other data showed that the proportion of oral problems and their treatment by dental and medical personnel associated with the level of education. In communities with better education levels, the lower the oral problems found, the proportion of receiving treatment from dental medical personnel has increased.

The level of oral problems in the elementary school-aged group is found to be relatively high, 67.3% at the 5-9 years age group, 51.9% at the 10-14 years age group, even though detection of all oral lesions as early as possible is essential to prevent severe conditions.[4] However, data of oral mucosal diseases and disorders obtained from Riskesdas 2018,[4] still requires further development for future implementation. Data on the oral mucosal condition still requires another important part to explore the causative factors or risk factors to prevent the development of a more severe condition, such as precancerous disease and cancer. Another consideration is that primary-school-aged children need healthy oral conditions because they can affect nutritional intake, intelligence, and learning concentration. If the children have experienced pain due to oral mucosal ulceration, it will result in difficulty and uncomfortable eating. The main reason for developing data analysis from the survey results is to know the distribution of oral lesions in children to handle each case appropriately and improve the quality of life.

Previous studies have widely reported the prevalence of oral mucosal lesions, especially in the adult population. There are only a few reports of pathological oral mucosal lesions data in the children population. A previous study was conducted in Istanbul on 1041 children, and 277 of them had more than 30 different types of detected lesions.[5] Fissured tongue (3.4%) was the most frequent lesion, followed by traumatic lesions (3.2%) and cheek biting (2.5%).[5] Similar studies in Chile have reported that of 101 patients, 37.62% had mucosal lesions.[6] The most common lesions were minor aphthous ulcers (6.9%), followed by irritated fibromas (5%), traumatic ulcers (5%), traumatic erosion (4%), impetigo (4%), pigmented lesions (3%), and the most common locations of lesions found are lips 38.5%.[6]

Köse et al.,[7] suggested that a previous study conducted in Italy has been carried out on the larger population of children. A total of 10,128 children (0-12 years) were enrolled, and it was found that 28.9% of the children had oral mucosal lesions.[7] The most frequently noted lesion was oral candidiasis (28.4%), geographic tongue and other tongue lesions (18.5%), followed by traumatic lesions (17.8%), recurrent aphthous ulceration (14.8%), herpes simplex virus infection type-1 (9.3%), and erythema multiforme (0.9%).7A more recent study conducted in Brazil of the 0 – 20-year

age group showed the most frequent diagnosis for oral lesions as an inflammatory process (24,4%); however, the type of oral lesion was not specified.[8] The oral mucosal condition is generally identified as an oral disease and a normal variation of the oral mucosal condition. Thus, the diagnosis requires careful examination and certainty of the expertise of an oral medicine specialist.[9] Oral diseases may directly affect a limited area of the human body, but their consequences and impacts affect the body as a whole.[2]

Oral diseases can be caused by specific agents, autoimmune, trauma, or unknown causes, so it often requires pharmacological and non-pharmacological treatment. Meanwhile, the normal variation of oral mucosal conditions can be overcome simply with a non-pharmacological approach by providing consultation in communication, information, and education to patients. These normal variations of oral mucosal conditions were associated with habits, lifestyle, and unbalanced nutrition intake, or morphology variations in organ development.[10]

An example of a typical normal variation of oral mucosal condition that is often found on the dorsum of the tongue is called the coated tongue. This condition is caused by the accumulation of biofilm/plaque and can cause complaints of bad breath or halitosis. Halitosis can be related to a habit or condition that is not relevant to medical or disease, such as consuming foods containing onions or garlic or physiological decreases in the salivary flow rate. In this condition, the management that can be done is a non-pharmacological approach. Nevertheless, on the other side, as many as 10% of cases of halitosis are found an indicator from systemic pathologies, such as diseases of the nose and throat, lung and respiratory disorders, diabetes, kidney and urological, gastro-esophageal disease reflux, and stomach-intestines imbalance, it requires further treatment related to systemic diseases and usually in the form of pharmacological therapy.[10]

Data collection regarding the oral mucosal conditions in children can help track the nutritional, economic, and social status of a children's population, and more importantly, provide early treatment for any oral cases found. This study was aimed to determine the most common oral mucosal lesions found among elementary school children and predicted the lesions to the diagnosis of oral disease or normal variation of the oral mucosa conditions. Prediction the diagnosis of oral disease or normal variation of the oral mucosa lesions is expected to be one of the early detection efforts of oral mucosal disease.

METHODS

This research used a descriptive observational method, which is the observation of a phenomenon in the population or sample, and then conditions found in the research were described. The cross-sectional method was conducted in one examination visit. The population of this research was fifth-grade elementary school students in the central area of the Jatinangor sub-district, Sumedang, West Java, Indonesia. Children are a vulnerable population category, so that fifth-grade elementary school students are considered to be able to represent the condition of the children, which is expected to not encounter many difficulties when collecting data. The sampling method used was purposive sampling. The inclusion criteria were healthy condition, cooperative, able to communicate with the examiner, and obtained permission from the parent/guardian.

The subjects were examined for oral mucosal conditions using disposable dental tools and white headlamp light support. The examiner consisted of two alternatives: a dentist and an oral medicine specialist or dental student and an oral medicine specialist. Oral medicine specialists were experts who confirmed the accuracy of the data. Data on name, age, sex, weight, and height were recorded as patient profile data. The flow of this research begins with examining all parts of the oral mucosa.

The oral mucosal lesions found were recorded and then the diagnosis of oral disease or the normal variation of the oral mucosal condition was predicted. Oral mucosal lesions that may be found include plaques, papules, nodules, macules, ulcers, erosions, exfoliation/desquamation, petechiae/purpura/ecchymosis, vesicles, bullae, and pustules.[9] Oral mucosal lesions and conditions found on examination predicted as oral diseases or normal variation of oral mucosal condition, which is a modification from the previous methods conducted by Unur et al.[5], Yáñez et al.[6], Majorana

et al.[7], Vasconcelos et al.[8], and Hussein et al. [11] Figure 1 shows the path of determining the predictive diagnosis of oral mucosal lesions as a normal variation of oral mucosal conditions, while Figure 2 as oral disease.

Some oral mucosal lesions that require reconfirmation were photographed using a digital camera. All subsequent data were recapitulated in a research table and processed statistically using a simple Microsoft Excel formula to obtain the frequency and percentages of oral mucosal disease and conditions. Ethical clearance has been obtained from the Health Research Ethics Committee of Universitas Padjadjaran (KEPK FK Unpad) with the number of 901/UN6.C10/PN/2017.

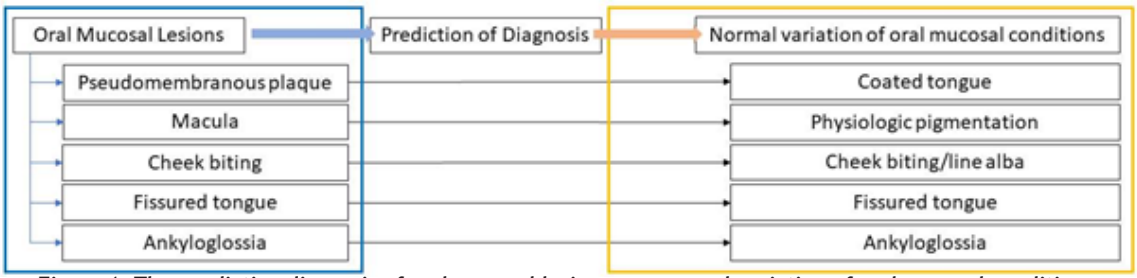

Figure 1. The predictive diagnosis of oral mucosal lesions as a normal variation of oral mucosal conditions

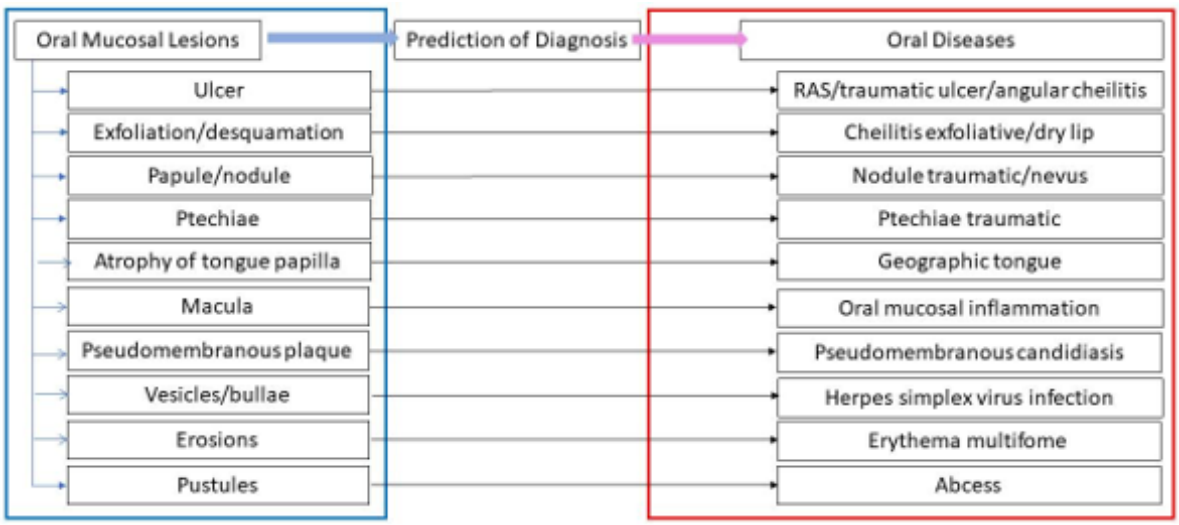

Figure 2. The predictive diagnosis of oral mucosal lesions as oral diseases

RESULTS

A total of 226 students, consisting of 115 males and 111 females, were included in this study. The age of students ranged from 10-12 years, the average student's weight was 31.94 kg, and the height was 136.09 cm. There were oral mucosal lesions in 88.5% of all research subjects (n=200/226). Some research subjects were known to have more than one oral mucosal lesion.

Oral mucosal lesions found in this study were pseudomembranous plaque in 100 cases, macula in 106 cases, 56 cases of ulcers, 45 cases of cheek biting, 31 cases of fissure tongue, 19 cases of ankyloglossia, 13 cases of lip exfoliation/desquamation, 7 cases of nodules, 4 cases of petechiae, as well as atrophy papilla of the tongue which was found in 3 cases (Table 1). The frequency and percentage of each oral mucosal lesion were calculated by the formula: the frequency of cases found divided by the total number of study subjects (n=226).

The lesions were then diagnosed as 100 cases of the coated tongue, 106 cases of physiological pigmentation, 56 cases of aphthous recurrent/traumatic ulcer/ angular cheilitis, 45 cases of the cheek biting/Linea alba, 31 cases of the fissured tongue, 19 cases of ankyloglossia, 13 cases of exfoliative cheilitis/dry lip, 7 cases of traumatic nodules/nevus pigmentosus, 4 cases of petechiae traumatic, 3 cases of geographic tongue, and others (Table 2).

Table 1. Distribution of oral mucosa lesion in fifth-grade primary school students in Jatinangor sub-district, Sumedang, (n=226)

No	The name of oral mucosa lesion	Found*)		Not found	
		Frequency	Percentage	Frequency	Percentage
1.	Pseudomembranous plaque	100	44.2	126	55.8
2.	Macula	106	46.9	120	51.3
3.	Ulceration	56	24.8	170	75.2
4.	Cheek biting	45	19.9	181	80.1
5.	Fissured tongue	31	13.7	195	86.3
6.	Ankyloglossia	19	8.4	207	91.6
7.	Exfoliation/desquamation	13	5.8	213	94.2
8.	Nodule	7	3.1	219	96.9
9.	Ptechiae	4	1.8	222	98.2
10.	Atrophy of tongue papilla	3	1.3	223	98.7

***)** Some research subjects were known to have more than one oral mucosal lesion.

In this study, we did not find any subjects with macular lesions which were inflammation of the oral mucosa, pseudomembranous plaques diagnosed as pseudomembranous candidiasis, vesicular and bullous lesions, erosive lesions, and pustules lesions.

Table 2. Predicted diagnosis of oral mucosal lesion in Jatinangor sub-district, Sumedang, (n=226)

No	Normal variation of oral mucosa condition	Total (n)
1	Coated tongue	100
2	Physiologic pigmentation	106
3	Linea alba/hyperkeratosis	45
4	Fissured tongue	31
5	Ankyloglossia	19
	Oral diseases	
1	Recurrent aphthous stomatitis/Traumatic ulcer/Angular cheilitis	56
2	Cheilitis exfoliative/dry lip	13
3	Nodule traumatic/nevus pigmentation	7
4	Petechiae post traumatic	4
5	Geographic Tongue	3
Total predicted diagnosis of oral mucosal lesion		**384**

***)** Some research subjects were known to have more than one oral disease.

DISCUSSION

The studies of oral mucosal lesions were often showed different results.[5,6,7,8] The other studies in the world mentioned that the variation of the results was between 4.1% and 69.5%.[12] In our study we found oral mucosa lesions in 200 subjects (88.5% of the total number of research subjects.
A study in India by Ambika et al., revealed an oral mucosal lesion found in 64.11% of children.[13] Research in Brazil by Viera-Andrade et al.,[14] found oral mucosal lesions in 40.7% of the study subjects. Another study by Unur et al., in Turkey found oral mucosal lesions in 26.6% of study subjects,[5] and a study in Tehran, Iran, found oral mucosal lesions in 28% of study subjects.[15]

Based on Table 1, the oral mucosal lesions found can lead to two conditions, partly to oral diseases and partly normal variation of oral mucosa. Ulceration, exfoliation/desquamation, nodule, purpura/ecchymosis/petechiae, and atrophy of tongue papillae, found in this study, were directed at oral disease conditions, whereas pseudomembranous plaque, macula, and cheek biting/hyperkeratosis were normal variation of oral mucosa conditions.

The fissure tongue and ankyloglossia were included in the normal variation of the oral mucosal

conditions that comes from developmental abnormalities hereditary. Some subjects had more than one oral mucosal lesion, either oral diseases or normal variation of the oral mucosal conditions, or a combination of both. Table 2 shows that the oral mucosal lesions have been converted to oral diseases or normal variation of the oral mucosal conditions.

The most common oral mucosal lesions were normal variation of the oral mucosal conditions, such as pseudomembranous plaque with the diagnosis coated tongue (n=100/44.2%), macular hyperpigmentation of the facial/labial gums diagnosed as physiological pigmentation (n=106/46.9%), cheek biting or hyperkeratosis diagnosed as linea alba/hyperkeratosis (n=45/19.9%), while the fissure tongue (n=31/13.7%) and ankyloglossia (n=19/8.4%) remains to be mentioned so because they are named according to their characteristic lesions.

The most common oral mucosal lesions which were categorized in oral diseases in the form of ulcerated lesions have an alternated diagnosis of recurrent aphthous stomatitis or traumatic ulcer or angular cheilitis (n=56/24.8%), followed by desquamated or exfoliative lesions found on the lips that were diagnosed as cheilitis exfoliative/dry lip (n=13/5.8%), whereas nodule lesions are diagnosed as traumatic nodules or nevus pigmentation (n=7/3.1%).

These two kinds of nodule lesions can be distinguished by the color and other characteristics of the lesions. Traumatic nodule lesions are raised than the surrounding mucosa that are tender in consistency, with the same color as the surrounding oral mucosal tissue, while the pigmentation nevus has a localized black color, is not too raised than the surrounding tissue, and is usually small in size. Other lesions found were lesions associated with the internal bleeding and based on the history preceded by mechanical trauma.

Purpura or ecchymosis or petechiae were classified as post traumatic petechiae in diagnosis (n=4/1.8%). Meanwhile, in 3 other cases (1.3%), lesions were found in the form of atrophy of tongue papilla which led to a diagnosis of the geographic tongue. The classification of oral mucosal lesions into a diagnosis refers to the theory in the related oral medicine literature,[9] and is a modified method of some previous research.[5,6,7,8,11]

Our results differ from other studies that have been mentioned previously.[5,6,7,8,13,14,15] These differences with other studies were suspected because of differences in age group of research subjects and possibly differences of accuracy of the examiner that was involved in the study. The results of the study were also varied with conditions in other parts of the world, possibly due to: differences in sociodemographic characteristics of the population, differences in determining the diagnostic criteria, lack or none of standard protocol studies in children, and differences in the number of subjects examined. Oral mucosal lesions associated with oral diseases can be influenced by genetic conditions and a person's systemic health, while in normal variation of oral mucosal conditions can be influenced by not only genetics and race, but also by habits in maintaining oral hygiene.[9]

Coated tongue condition is known to be related to self-care effort of oral hygiene, which at the age of 10-12 years were expected to be good, but apparently not yet appeared. Other possibilities are also associated with eating habits that are less fiber, high carbohydrates, and soft consistency.[9,16] Coated tongue was also found in many similar studies in Brazil (23.4%),[8] however our study found a higher prevalence (44.2%).

The condition of physiological pigmentation due to genetic factors derived from dark-skinned and race parents, whereas the condition of tongue fissure and ankyloglossia has existed since birth due to morphological variation in the formation of tongue organs. The prevalence of physiological pigmentation in the form of melanotic macular lesions in our study found 46.9%, more than in Brazil 14.4%,[14] and in India 10.08% for the age group of 4-7 years,[13] but only 1 case in Turkey 0.57%,[5] then they were thought to be related to ethnic/race-derived parents to their children.

The conditions of normal variation of oral mucosa were not harmful, but some of them required attention to prevent further disorders or oral disease. The condition of coated tongue and fissured tongue require management in the form of daily tongue cleansing, because the remaining food that was trapped on the tongue papilla and fissures were the preferred medium for the growth of microorganisms and at risk of fungal infection. Condition of ankyloglossia and

physiological pigmentation mostly complained as an aesthetic disorder that can be eliminated by performed surgery.[9,17]

Other oral mucosal lesions are included in the category of oral diseases: ulcer in form of aphthous recurrent/traumatic ulcer/angular cheilitis, exfoliation/desquamation of the lips or cheilitis exfoliative/dry lip, nodules or traumatic nodules/nevus pigmentosus, purpura/ecchymosis/ traumatic petechiae, and tongue papillae atrophy or geographic tongue (Table 2). Ulcers in this study were found in 56 cases (24.6%), whereas higher than those in Spain.[16]

The prevalence of Angular cheilitis in children were also found to vary: 0.7% (India),[13] 3% (Brazil),[8,14] and 0.28% (Turkey),[5] whereas in this study found fewer about 2.9%. Ulceration in children was often caused by trauma or fungal infections, or predisposed by an imbalance of nutritional intake. Other diagnoses of ulceration lesions may also be due to or associated with dislocation of tooth fragments or dental infections. Teenagers begin experiencing recurrent aphthous stomatitis on the average starting at the age of 15-16 years, but fewer are found in children. The variation data of the prevalence/incidence of ulcerated lesions in the world ranged from 0.09% - 12.17%.[8,12,17,18,19,20]

The diagnosis of oral disease in this study is difficult to determine in a single visit, as it requires an in-depth anamnesis and case analysis. So then, in this study we grouped the diagnosis according to the different types of lesions found. We found 13 cases (5.7%) of lip desquamation/ exfoliative. Desquamation of the lip was usually associated with a lack of fluid intake, resulting in crack lip/dry lip/cheilitis exfoliative. Nodule lesions and bleeding such as purpura/ecchymosis/ petechiae are also most suspected to be associated with both acute (purpura/ecchymosis/ petechiae), and chronic (nodular) trauma. Trauma is often experienced by children and they often bite this lesion purposely, so that recurrence again repeatedly. This bad habit can lead to the body's defense mechanism in the form of overgrowth of connective tissue and caused a nodul.[16,19]

We also found 3 cases of Geographic tongue. Geographic Tongue was also often found at very early childhood/age in children with chronic disease.[5,10,11] Prevalence decreases with age or disappears. One of the predisposing factors of the geographic tongue was associated with nutritional deficiency, so that it can be included in the category of oral disease.[8,17,18,20,21]

Determining the diagnosis of several oral diseases requires a comprehensive examination, however in this study it was difficult to do it ideally because it is community-based with many subjects. In this study, several oral mucosal lesions have a characteristic clinical feature so that they can be diagnosed directly, do not require additional laboratory investigation, and are usually non-oral mucosal diseases or normal variations of the condition of the oral mucosa. The results of this study are expected to help provide mucosal oral health data to improve the health status of individuals and communities. Based on this study results, further research on the oral mucosal condition of children needs to be done for the development of science and improvement of public health status.

CONCLUSION

The most common oral mucosal lesions found in elementary school children were macula, which predicted to be diagnosed as physiologic pigmentation, followed by pseudomembranous plaque, which predicted to be diagnosed as coated tongue. Coated tongue and pseudomembranous plaque are normal variations of the oral mucosal conditions.

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