

Nutritional Status, Oral Hygiene and Angular Cheilitis in School children in Cianjur District, West Java

Fatimah Boenjamin Partakusuma

Departement of Pediatric Dentistry Trisakti Universitas Jakarta Indonesia

ABSTRACT

Background: Angular cheilitis is a lesion at the corner of the mouth. Clinically, it is visible as an erythema and ulceration that occasionally extend beyond the vermillion border onto the skin. Anemia in children is an issue of global nutritional problems that need attention. The objectives of the study was to determine the association between nutritional status, oral hygiene and angular cheilitis in elementary schoolchildren in District of Cianjur. **Methods:** This cross sectional study was conducted on 349 schoolchildren in five Subdistrict of Cianjur. Angular cheilitis status was determined based on the criteria set by Ohman (1986). Anthropometric status was determined by CDC BMI-for-age percentile growth chart. Anemia status was determine by the level of hemoglobin concentration using the HemoCue device. Oral hygiene was measured by OHI-5 index. **Results:** The prevalence of angular cheilitis, anemia, wasting and poor oral hygiene were: 62.5%, 12,6%, 20.6%, and 67.3%, respectively. There are no relationships between anthropometric status, oral hygiene and angular cheilitis. ($p > 0.05$). However there is a relationship significant relationship between anemia and angular cheilitis ($p < 0.05$). Logistic regression test showed that anemia is a risk factor on the occurrence of angular cheilitis. **Conclusion:** Anemia is a factor on the occurrence of angular cheilitis in schoolchildren in Cianjur.

Key words: Angular cheilitis, anemia, anthropometric status, oral hygiene status.

ABSTRAK

Latar Belakang: *cheilitis angularis* adalah lesi di sudut mulut yang secara klinis terlihat sebagai eritema dan ulserasi yang kadang-kadang melampaui batas *vermillion* ke kulit. Anemia pada anak adalah masalah gizi global yang memerlukan perhatian. Tujuan penelitian adalah untuk mengetahui hubungan antara status gizi, kebersihan mulut dan *cheilitis angularis* pada anak sekolah dasar di Kabupaten Cianjur. **Metode:** Penelitian potong lintang ini dilakukan pada 349 anak sekolah dasar di lima Kecamatan di Cianjur. Status *cheilitis angularis* ditentukan berdasarkan kriteria yang ditetapkan oleh Ohman (1986). Status antropometri dinilai berdasarkan grafik pertumbuhan persentil CDC BMI menurut usia. Status anemia dinilai berdasarkan konsentrasi hemoglobin dengan menggunakan perangkat HemoCue. Status kebersihan mulut dinilai dengan indeks OHI-S. **Hasil:** Prevalensi *cheilitis angularis*, anemia, anak kurus dan kebersihan mulut yang buruk berturut-turut adalah: 62,5%, 12,6%, 20,6%, dan 67,3%. Tidak ada hubungan antara status antropometri, kebersihan mulut dan *cheilitis angularis*. ($p > 0,05$). Sebaliknya ditemukan hubungan yang signifikan antara anemia dan *cheilitis angularis* ($p < 0,05$). Uji regresi logistik menunjukkan bahwa anemia merupakan faktor risiko pada kejadian *cheilitis angularis*. **Kesimpulan:** Anemia merupakan faktor pada kejadian *cheilitis angularis* di sekolah dasar di Cianjur.

Kata Kunci: *Cheilitis angularis*, anemia, Status antropometri, status kebersihan mulut.

INTRODUCTION

Angular cheilitis is an infectious disease with multifactorial etiology. It is an inflammation characterized with eroded red lesions, cracking or thinning or fissuring, radiating from corners of the mouth. The lesion can be found unilateral or bilateral. Angular cheilitis is often found in schoolchildren in Indonesia, especially in lower socioeconomic groups.^{1,2}

Angular cheilitis is not a lethiferous disease and it is a self limiting disease, but it can interfere with child activities by causing pain. The etiology of angular cheilitis among others are socio-economic factors, nutrition, oral hygiene as well as genetic factors. Cheilitis. Iron deficiency, vitamin B12, riboflavin and folate has been reported to influence the occurrence of angular cheilitis.¹

Nutritional assessment in community can be measured by various methods that are dietary, anthropometric, laboratory and clinical measurements. Assessment of nutritional status based on anthropometric measurement is the assessment of body size dimensions that describes the imbalance of energy and protein. Anthropometric status varies according to age and degree of nutritional status, is able to identify nutritional deficiencies found in the past, although not specific for certain nutrients. 3 Determination

of nutritional status based on anthropometric status using various anthropometric index such as weight for age Z scores, height for age Z scores and weight for height Z scores, or using the CDC clinical growth charts according to 2000 CDC growth charts for the United States: Methods and development. National Center for Health Statistics.⁴

One of the laboratory measurements of nutritional assessments is hemoglobin concentration which may indicate a possibility that a person is suffering from iron deficiency anemia. Anemia is a lack of hemoglobin in the blood caused by deficiency of nutrients required for the formation of hemoglobin. According to Kassebaum et al⁵ the global the prevalence of anemia in 2010 was 32.9%. The prevalence of preschool children who suffer from anemia in 2008 according to World Health Organization was 47% of the whole preschool children in the world.⁶

Function of hemoglobin is carrying oxygen from the lungs to all cells and return to the lungs with carbon dioxide. Hemoglobin consists of heme which is a component that contains iron, which is attached to the globin protein. A small portion of iron (about 5%) contained in the muscles as myoglobin, about 1% associated with enzyme systems, and the rest is stored in the body.³ In Indonesia the majority of anemia is caused by

lack of iron and is called iron deficiency anemia. Iron deficiency anemia is a predisposing factor for candidosis that can therefore mediate angular cheilitis. Iron deficiency anemia is affecting more than 30% children of the global population.⁷⁻¹⁰

Oral health has an important role as an integral part of the whole health. Poor dental health condition can affect the daily activities. Measurements of oral hygiene status can describe the condition of oral health and the surrounding tissues.

Boenjamin's research in 2010, found 48% of children in Sub-district of Cipanas had poor oral hygiene. The prevalence of angular cheilitis in this district was very high because it was difficult to find a child who did not suffer from angular cheilitis or did not have a cheilitic scar. The oral hygiene index simplicity by Green and vermilion (1964) is often used to measure the oral hygiene in community. This index contains of two components which are calculus index and debris index. In this index, the surfaces selected to indicate the oral hygiene are four posterior teeth and two anterior teeth.¹¹

MATERIAL AND METHODS

This cross sectional study was conducted in Cianjur District, in Cipanas and outside Cipanas Sub-district. Lemeshow formula was used to calculate the sample size in this study.¹² Angular cheilitis was assessed based on the criteria set by Ohman.¹³ Anthropometric status used in this study is the body mass index and the corresponding BMI-for-age percentile on a CDC BMI-for-age growth chart for children and teens, aged 2 through 19 years old.¹⁴

Weight of each subject was measured using an electronic weighing scale to the nearest 0.1 kg, and height was measured to the nearest 0.1 cm using a microtoise. All anthropometric measurements throughout the study were performed by two

trained assistants with standardised techniques according to WHO procedures.

Category CDC BMI percentile children: a. Underweight - less than the 5th percentile; b. Normal weight - 5th percentile to 85th percentile; c. Overweight - 85th to less than 95th percentile; d. Obese - equal to or greater than 95th percentile.

Anemia status was determine by the level of hemoglobin concentration using the HemoCue device. Anemia status was assessed by: Hb <11.5 g / dL for subjects aged 6-11 years; Hb <12 g / dL for subjects aged > 12 years.³

Oral hygiene status was measured by the OHI-S (Simplified Oral Hygiene Index) of Green and Vermillion. OHI-S is an index of a sum of Debris Index and the Calculus Index.¹¹

RESULTS

The subjects of this study was 349 schoolchildren in five Subdistricts of Cianjur. The research sites are located in the City and outside of Cipanas. Altitude in this area is approximately 1,110 m above the sea level, with a temperature of 25° C. In this study we found 149 (42.7%) of the participants were male and 200 (57.3%) were female. Of the 349 schoolchildren in this study, 218 (62.5%) had angular cheilitis, 131 (37.5%) were cheilitis free. There was no significant difference in the occurrence of angular cheilitis between male and female schoolchildren.

The prevalence of underweight, anemia among the school children was 20.6% and 12.6% respectively. There was no significant difference in the frequency of anemia between sexes ($p > 0.05$), but angular cheilitis was significantly more prevalent in anemic than in non-anemic school children ($p = 0.008$). Subjects which suffers from anemia s tend to suffer more from angular cheilitis than non anemic subjects.

Tabel 1. Distribution angular of cheilitis by sex, bmi status, anemia, and oral hygiene.

		Angular Cheilitis						
		Cheilitis		Non-Cheilitis		Total	Chi-Square	
		n	%	n	%		N	X ²
Sex	Girls	118	59.0	82	41.0	200	2.398	0.122
	Boys	100	67.1	49	32.9	149		
BMI	Underweight	41	56.9	31	43.1	72	2.74	0.100
	Normal	177	63.9	100	36.1	277		
Anemia	Anemic	35	79.5	9	20.5	44	9.429	0.008
	Normal	183	60.0	122	40.0	365		
Oral Hygiene	Poor	72	62.6	43	37.4	115	0.02	0.969
	Good	146	62.4	88	37.6	234		

Logistic regression to model the odds ratio (OR) for the occurrence of angular cheilitis in relation to sex, BMI status, anemia and oral hygiene showed that anemia was a significant risk factor for the occurrence of angular cheilitis. Subjects with anemia in Cianjur has opportunities to suffer from angular cheilitis 2.7 times greater compared to non anemic subjects.

DISCUSSION

Angular cheilitis is still a prevalent disease of the oral cavity which are found in various areas especially in the highlands in Indonesia. Its prevalence from year to year is not receding. There are many etiological factors associated with the occurrence of angular cheilitis, among others are under nutrition, socio-economic factors and oral hygiene.

According to the literatures, 35% of angular cheilitis is caused by *Candida albicans*. In this study, it was found that in subjects with angular cheilitis which also suffered from malnutrition, anemia, and had poor oral hygiene were 59.6%; 79.5% and 62.6% respectively. Malnutrition is a major cause of angular cheilitis in the third world countries. The most common anemia is iron deficiency anemia. Iron is needed for the growth and differentiation of all cells. Iron plays a role in oxygen transport, electron transfer, and serves as a cofactor in many enzyme systems, such as peroxide-generating enzymes and nitrous oxide-generating enzymes that are essential to the proper functioning of the immune cells.¹⁵ Iron deficiency may lower the immune system by

impairing the cellular immunity, so it provide of opportunistic infections such as *Candida albicans* for the occurrence angular cheilitis especially in poor oral hygiene subjects.

The prevalence of anemia in many areas in Indonesia is still high at around 12%, it was not much different from our study that found the prevalence of anemia was 12.6%. This study supports previous research stating that there was a relationship between anemia and angular cheilitis .

Underweight in this study is found as much as 20% of the whole subjects, but the results of this study showed no association between underweight and angular cheilitis. This result did not support other study concerning angular cheilitis, like our study that was conducted in Jakarta in 2008 that showed there was a relationship between underweight and angular cheilitis. It might be due to more than 60% of the subjects in this study suffered from angular cheilitis, and we had difficulty to find children who was not suffered from angular cheilitis. It was either the subject had angular cheilitis or had a cheilitic scar.

Some previous research stated that there was a relationship between oral hygiene status and angular cheilitis, but not this study. It might be because even though the subjects had poor oral hygiene but the OHI-5 score were not too high, and the prevalence of dental caries in this area was not high. So may be this is why this study does not support other studies that claims that there is a relationship between oral hygiene and angular cheilitis.

Logistic regression test showed that anemia was a risk factor for the occurrence of angular

cheilitis, and subjects with anemia had a risk to suffer from angular cheilitis 2.6 times higher than the non-anemic subjects. This is an important information for policy makers to give more attention to the health of poor people in many areas in Indonesia that are less able to support the nutritional needs of their families.

The high prevalence of angular cheilitis in this area is not declining over the years. So it is important for further research to be conducted to complete the knowledge on the factors that contribute to the occurrence of angular cheilitis in this area.

CONCLUSION

Anemia is a risk factor for the occurrence of angular cheilitis. Further research on soft tissue disorders in the oral cavity is required to add information about oral diseases in the community as well as their managements.

REFERENCES

1. Blanck HM, Bowman BA, Serdula MK, Khan LK, Kohn W and Woodruff BA. Angular stomatitis and riboflavin status among adolescent Bhutanese refugees living in southeastern Nepal. *Am J Clin Nutr* 2002, 76(2): 430-435.
2. Cawson RA, Binnie WH, Barrett AW, Wright JM. Oral disease. Clinical and pathological correlations. Ed. 3 Mosby Edinburg. 2001: 13
3. WHO/UNICEF/UNU. Iron deficiency anemia: assessment, prevention, and control. A guide for programme managers. Geneva: World Health Organization 2001:1-114.
4. Gibson SG. Principles of nutritional assessment. 2nd ed. 2005. Oxford: Oxford University Press; 2005. p. 557-559.
5. Mei Z, Grummer-Strawn LM. Standard deviation of anthropometric Z-scores as a data quality assessment tool using the 2006 WHO growth standards: a cross country analysis. *Bull World Health Organ*. Geneva 2007, 85 (6): 441-448.
6. Kassebaum NJ, Jasrasaria R, Naghavi M, et al. A systematic analysis of global anemia burden from 1990 to 2010. *Blood* 2014;123(5):615-624.
7. Benoist B, McLean E, Egli I, Cogswell M. Worldwide prevalence of anaemia 1993-2005. Geneva, Switzerland: World Health Organization; 2008.
8. WHO/UNICEF/UNU. Iron deficiency anemia: assessment, prevention, and control. A guide for programme managers. Geneva: World Health Organization 2001:1-114.
9. Oppenheimer SJ. Iron and Its Relation to Immunity and Infectious Disease. *J. Nutr.* 2001, 131: 616S-635S.
10. Zimmermann MB, Wegmueller R, Zeder C, Chaouki H, Biebinger R, Hurrell RF, and Windhab E. Triple fortification of salt with microcapsules of iodine, iron, and Vitamin A. *Am J Clin Nutr* 2004, 80:1283-90.
11. Zimmermann MB, Biebinger R, Rohner F, Dib A, Christophe Zeder C, Hurrell RF, and Chaouki. Vitamin A supplementation in children with poor vitamin A and iron status increases erythropoietin and hemoglobin concentrations without changing total body iron. *Am. J Clin Nutr* 2006;84:580 - 6.
12. Green JC dan Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc.* 1964 Jan; 68:7-13.
13. Lemeshow et al. Adequacy of sample size in health studies. WHO. Chichester: John Wiley & Sons;1990.
14. Ohman S-C, Dahlén G, Möhler A. Angular Cheilitis: A Clinical and Microbial Study. *J Oral Pathol* . 1986; 5:213-217.
15. Kuczumarski RJ, Ogden CL, Guo SS, et al. 2000 CDC growth charts for the United States: Methods and development. National Center for Health Statistics. *Vital Health Stat* 11(246). 2002.
16. Shin-Yu Lu. Perception of iron deficiency from oral mucosa alterations that show a high prevalence of Candida infection. *J Formosan Med Assoc* 2016: XX-1-9.