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# Oral Manifestations of Anaemia and Vitamin D Insufficiency In Pediatric-Patient

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**Abstract**

**Background**: Anaemia is defined as a condition in which the number of red blood cells is poorly lowered. Vitamin D plays an important role in various biological systems, such as accelerating wound healing and regulating the immune system. Around 50% of the global population has vitamin D insufficiency. Both conditions in children are associated with impaired growth and developmental delay and can cause oral lesions. The aim of this paper is to report the oral manifestations related to anemia and vitamin D insufficiency in a pediatric patient. **Case Report**: A 6-year-old male came to the Dental and Oro Maxillofacial Unit, Universitas Indonesia Hospital, with a complaint of a canker sore on the lower gingiva since a week ago. Medical history revealed iron deficiency anemia in infancy and vitamin D deficiency. Intraoral examination showed a shallow single ulcer on the attached gingiva near the mucobuccal fold in the 71-81 region, linea alba, and mild atrophy on the tongue. Laboratory tests showed a low level of serum 25(OH)D.**Case Management**: A referral to a pediatrician was made. The patient was prescribed Vaseline and given hyaluronic acid gel to reduce pain. The patient was suggested to continue Vitamin D supplement and encouraged to carry out periodic control to the pediatrician. **Discussion**: Oral manifestations of anemia include angular cheilitis, atrophic tongue, and stomatitis. Vitamin D is confirmed to deliver strong immunomodulatory effects on both innate and acquired immunity responses in the pathogenesis of certain oral mucosal lesions. Comprehensive examination and identification of underlying conditions are very important in treating pediatric patients. **Conclusion**: Dentists play an important role in identifying oral disorders related to nutritional deficiencies, to further determine the appropriate treatment plan and referral. Management of oral lesions in pediatric cases requires an interdisciplinary approach with a pediatrician.

Keywords: Anemia; Vitamin D Deficiency; Pediatric Patient; Oral Ulcers

## 1. Introduction

Anemia is a condition in which the total haemoglobin (Hb) level or number of red blood cells (RBCs) is lower than normal and results in poor oxygenation of body tissue.[1,2] The World Health Organization (WHO) defines childhood anemia as Hb concentration below 11 g/dL in children between 6 and 59 months.[2] About 40% to 60% of children aged 6 to 23 months in developing countries had anemia-associated cognitive development problems.[3] Anemia may also present certain oral manifestations, which include angular cheilitis, atrophic tongue, and recurrent oral ulcers.[1] In addition to anemia, vitamin deficiencies, such as vitamin D deficiency, may also play a role in increasing the risk of systemic and oral diseases. Vitamin D is a fat-soluble steroidal vitamin and can be obtained from exposure to sunlight, diet, and dietary supplements.[4,5] Vitamin D deficiency is frequently reported worldwide with a prevalence of around 1 billion people and around 50% of the global population has vitamin D


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insufficiency.[6] Vitamin D deficiency in children can result in softening and weakening of the bones and is associated with impaired growth, developmental delays, and hypocalcemic seizures.[7] In relation to oral health, recent studies show the role of vitamin D in maintaining the homeostasis of oral epithelium and of oral immunity.[8] A number of evidence links vitamin D deficiency or insufficiency to several oral mucosal diseases including recurrent oral ulcers.[9]

The study of orofacial manifestations of these conditions is important because these signs and symptoms may be the first clinical presentation that alerts the dentist or clinician to underlying disorders. This paper reports the oral manifestations related to anemia and vitamin D insufficiency in a 6-year-old male patient. Early diagnosis and prompt treatment of anemia and vitamin D deficiency in children is important to improve their quality of life.

## 2. Case Report

A 6-year-old male came to the Dental and Oro Maxillofacial Unit, Universitas Indonesia Hospital, accompanied by his mother, with a chief complaint of canker sore on the lower gingiva since a week ago. The canker sore was initially small but increased in size. There was no fever or vesicle before the appearance of the canker sore. The patient admitted that the canker sore was very painful and he refused to eat, drink, and brush his teeth.

The mother admitted a history of recurrent canker sore, but in the last month, it had become more frequent. The canker sore first appeared in 2019 when the patient was 3 years old. It appeared as single or multiple ulcers and usually healed within a week. Reported sites of canker sore were buccal mucosa, gingiva, and palate. Family history of canker sore was denied. The patient was diagnosed with iron deficiency anemia in 2019 and underwent 3 years of therapy. The mother also admitted that her son is a picky eater. The patient weighed 16 kilograms, which was lower than children his age. The patient prefers to eat fruits (papaya, banana, grapes) rather than vegetables or meat. The last laboratory test conducted by the patient was in August 2022 and showed normal values, except for a serum level of 25(OH)D (17.7 ng/mL) which was categorized as vitamin D deficiency. The patient had already stopped iron supplements in 2022. The patient was prescribed Vitamin D 2000 IU once a day for three months. In December 2022, the dose was reduced to 1000 IU once a day. The mother admitted that sometimes she forgot to give the patient vitamin D due to her everyday job as a lecturer. The patient hadn't been to the pediatrician since then. The mother had once tried to treat the canker sore using Aloclair Plus® in the form of both gel and spray, but the patient felt uncomfortable using the spray and only used the gel. After the appliance of the gel, the patient felt that the pain was reduced and the canker sore improved in two days. The patient never used Aloclair again afterward.

Extraoral examination showed dry and desquamated lips. Intraoral examination revealed a shallow single ulcer, 2 x 1,5 mm in size with a yellowish-white base, well- circumscribed, surrounded by an erythematous halo and edema on attached gingiva near mucobuccal fold in 71-81 region (Figure 1). Other oral findings were linea alba and mild papillary atrophy on the dorsolateral of the tongue. (Figures 2 and 3)

## 3. Case Management

We made a referral to the pediatrician for evaluation regarding the patient's history of iron and vitamin D deficiency. The patient was prescribed Vaseline ointment to be applied on the lips three times a day, and apply Aloclair plus gel on the canker sore three times a day. Laboratory tests including complete blood count, ferritin, CRP, 25(OH)D, blood plasma, and zinc were ordered by the pediatrician. The result showed all values were within the normal range, except for 27.3 ng/mL for 25(OH)D which was categorized as vitamin D insufficiency, and 0.2 for CRP, which was below the normal range. The patient was suggested to continue Vitamin D 1000 IU supplement and was encouraged to carry out periodic control to a pediatrician for evaluation of vitamin D level.

Figure 1. Shallow single ulcer, 2 x 1,5 mm in size with yellowish-white base, well- circumscribed, surrounded by an erythematous halo and edema on attached gingiva near mucobuccal fold in 71-81 region.

Figure 2. Linea alba on both sides of the buccal mucosa.

Figure 3. Mild atrophy on the dorsolateral of tongue

Figure 4. One-month follow-up.

## 4. Discussion

Anemia is a term used to define a decrease in the oxygen-carrying capacity of the blood characterized by a decrease in the number of red blood cells, hemoglobin, and hematocrit. Iron deficiency is the predominant cause of anemia across countries and in both sexes with women more commonly afflicted.[10] Systemic signs and symptoms of anemia include mucous membrane pallor, tachycardia, tiredness, and lightheadedness.[1] Anemia may also manifest certain oral findings, some of which are specific and some are non-specific to the condition which includes angular cheilitis, atrophic tongue, and recurrent oral ulcers.[1,10] In this case, intraoral examination revealed a shallow single ulcer, 2 x 1,5 mm in size with a yellowish-white base, well-circumscribed, surrounded by an erythematous halo and edema on attached gingiva near mucobuccal fold in 71-81 region. Mild papillary atrophy on the dorsolateral of the tongue was also observed. According to a study conducted by Porter et al, oral ulcerations were the most common disease which was caused by epithelial atrophy caused by iron deficiency.[11] Iron is essential to the normal functioning of oral epithelial cells, and lack of iron results in rapid epithelial cell turnover.[12] Absence of complete or partial fungiform papillae, also known as atrophic glossitis, is characterized by the smooth aspect of the tongue.[13,14] This condition is believed to have a mutual cause-and-affects relationship with nutritional deficiencies. In other words, nutritional deficiencies may cause atrophic glossitis and vice versa. Patients with atrophic glossitis may experience a burning sensation, dysfunction of taste, or numbness of the tongue. Chiang et al suggested that these symptoms may interfere with eating and swallowing in atrophic glossitis patients.[14] The difficulties in eating and swallowing caused by either oral ulcer or atrophic glossitis may result in reduced food intake and nutritional deficiencies.[13,14]

Vitamin D deficiency is highly implicated in oral diseases and has been linked with a higher risk of tooth defects, caries, periodontitis, and oral treatment failure.[5] In addition to anemia, many recent studies investigated the potential association between vitamin D and the risk of recurrent oral ulcers. The exact mechanism behind the effects of vitamin D on recurrent oral ulcers is still unclear, but it is associated with its immunomodulatory effects. Vitamin D is confirmed to deliver strong immunomodulatory effects on both innate and acquired immunity responses, as well as on cytokines levels, all of which are thought to be involved in the pathogenesis of recurrent oral ulcers.[9,15] In this case, the patient's laboratory test in 2022 showed 17.7 ng/mL for 25(OH)D serum level which is categorized as vitamin D deficiency. Compared to the previous result, the number increased in laboratory tests conducted in 2023, (27.3 ng/mL) but still categorized as vitamin D insufficiency. A study conducted by Öztekin et al revealed that patients with recurrent oral ulcers have vitamin D deficiency, and it is in accord with a study conducted by Zakeri et al.[16,17] According to the study by Nalbantoğlu, serum levels of vitamin D in children with recurrent oral ulcer, aged 3–12 years, were decreased.[18]

Vitamin D also helps heal wounds by binding with the vitamin D receptor (VDR) through calcitriol. The anti-inflammatory properties of vitamin D are considered to have an antiproliferative effect on skin and mucosal regeneration with suppression of monocytes and inflammation. A study by Siregar et al revealed that Vitamin D supplementation has shown effectiveness in wound-healing processes in the oral mucosa. To improve this condition, the patient was suggested to continue Vitamin D 1000 IU regularly and carry out periodic control to the pediatrician for evaluation of vitamin D level.[6]

. In this case, anemia and vitamin D insufficiency were identified as risk factors through subjective and objective examination. Therefore, management of this patient requires referral to the pediatrician for evaluation and periodic control. Management strategy of recurrent oral ulcers aims primarily at alleviating pain, shortening the healing time, and reducing the frequency rates of new episodes. Hyaluronic acid (HA), also known as Hyaluronan, has recently been introduced for the management of various oral and systemic inflammatory conditions with very promising results. The clinical efficacy of HA in relieving oral ulcer symptoms can be attributed to its analgesic and potent anti- inflammatory properties. It has been reported to have strong wound healing properties, probably through moderation of the inflammatory responses, promoting cell proliferation, and promoting re-epithelization via the proliferation of basal keratinocytes.[19] In this case, the patient responds well to Aloclair, which contains hyaluronic acid. We also prescribed Vaseline album as a lip protector, so the lips do not dry and peel.

Children have rapid physical growth and development, therefore, inadequate nutrition leads to irreversible effects on their growth and development. Oral lesions can be the first manifestation of nutritional deficiencies or other underlying disorders. Dentists should be aware of these manifestations so that an early diagnosis can be made and the appropriate treatment and referral can be determined. Hence, their quality of life is improved.

## 5. Conclusion

Dentists play an important role in identifying oral disorders related to nutritional deficiencies, to further determine the appropriate treatment plan and referral. Management of oral lesions in pediatric cases requires an interdisciplinary approach with a pediatrician.

## References

[1] Alsheikh E, Amr E, Zahran F. Prevalence of oral manifestations of iron deficiency anemia in a sample of Egyptian population, hospital-based cross-sectional study. *ADJC*. 2019;1(3):64-71. doi:10.21608/adjc.2019.14315.1024

[2] Mithra P, Khatib MN, Sinha AP, et al. Interventions for addressing anemia among children and adolescents: An overview of Systematic Reviews. Front Pediatr. 2021;8. doi:10.3389/fped.2020.549549

[3] Molla A, Egata G, Mesfin F, Arega M, Getacher L. Prevalence of anemia and associated factors among infants and young children aged 6–23 months in Debre Berhan Town, North Shewa, Ethiopia. J Nutr Metab. 2020;1-12. doi:10.1155/2020/2956129

[4] Başarslan F, Kaba İ. Evaluation of Vitamin D Levels in Pediatric Patients With Recurrent Aphthous Stomatitis. Cureus. 2020;14(11). DOI 10.7759/cureus.32064

[5] Botelho J, Machado V, Proença L, Delgado AS, Mendes JJ. Vitamin D deficiency and Oral Health: A Comprehensive Review. Nutrients. 2020;12(5):1471. doi:10.3390/nu12051471

[6] Siregar FD, Hidayat W. The role of vitamin D on the wound healing process: A case series. Intl Med Case Reports Journal. 2023;16:227-232. doi:10.2147/imcrj.s402005

[7] Loyal J, Cameron A. Vitamin D in children: Can we do better? Pediatrics. 2020;145(6). doi:10.1542/peds.2020-0504

[8] Khammissa RA, Fourie J, Motswaledi MH, Ballyram R, Lemmer J, Feller L. The biological activities of vitamin D and its receptor in relation to calcium and bone homeostasis, cancer, immune and cardiovascular systems, skin biology, and Oral Health. Biomed Res Int. 2018;1-9. doi:10.1155/2018/9276380

[9] Al-Maweri SA, Al-Qadhi G, Halboub E, et al. Vitamin D deficiency and risk of recurrent aphthous stomatitis: Updated meta-analysis with trial sequential analysis.Fron Nutr. 2023;10. doi:10.3389/fnut.2023.1132191

[10] Nirmala SVSG, Saikrishna D. Dental Considerations of Children with Anemias - An Overview. J Dent & Oral Disord. 2019; 5(2): 1113.

[11] K S. Significance of ferritin in recurrent oral ulceration. J Clin Diagn Res. Published online 2014. doi:10.7860/jcdr/2014/7472.4091

[12] Wu Y-C, Wang Y-P, Chang JY-F, Cheng S-J, Chen H-M, Sun A. Oral manifestations and blood profile in patients with iron deficiency anemia. J Formos Med Assoc. 2014;113(2):83-87. doi:10.1016/j.jfma.2013.11.010

[13] Erriu M, Pili FMG, Cadoni S, Garau V. Diagnosis of lingual atrophic conditions: Associations with local and systemic factors. A Descriptive Review. Open Dent J. 2016;10(1):619-635. doi:10.2174/1874210601610010619

[14] Chiang C-P, Chang JY-F, Wang Y-P, Wu Y-H, Wu Y-C, Sun A. Atrophic glossitis: Etiology, serum autoantibodies, anemia, hematinic deficiencies, hyperhomocysteinemia, and management. J Formos Med Assoc. 2020;119(4):774- 780. doi:10.1016/j.jfma.2019.04.015

[15] Hussein FF, Sadek HS, Elmarssafy LH. Impact of vitamin D3 supplementation on recurrent aphthous ulcer. Indian Journal of Pharmaceutical Sciences. 2022;84(S1). doi:10.36468/pharmaceutical-sciences.spl.440

[16] Zakeri M, Parsian H, Bijani A, Shirzad A, Neamati N. Serum levels of vitamin D in patients with recurrent aphthous stomatitis. Dent Med Probl. 2021;58(1):27–30. doi:10.17219/dmp/126360

[17] Öztekin A, Öztekin C. Vitamin D levels in patients with recurrent aphthous stomatitis. BMC Oral Health. 2018;18(1). doi:10.1186/s12903-018-0653-9

[18] Nalbantoğlu B, Nalbantoğlu A. Vitamin D levels in children with recurrent aphthous stomatitis. Ear Nose Throat J. 2019;99(7):460-463. doi:10.1177/0145561319882783

[19] Al-Maweri SA, Alaizari N, Alanazi RH, et al. Efficacy of hyaluronic acid for recurrent aphthous stomatitis: A systematic review of Clinical Trials. Clin Oral Investig. 2021;25(12):6561-6570. doi:10.1007/s00784-021-04180-