Journal of the Formosan Medical Association (2014) 113, 83–87

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jfma-online.com

ORIGINAL ARTICLE

Oral manifestations and blood profile in patients with iron deficiency anemia

Yang-Che Wu [a,b], Yi-Ping Wang [a,b], Julia Yu-Fong Chang [a,b,c], Shih-Jung Cheng [a,b], Hsin-Ming Chen [a,b,d], Andy Sun [a,b,*]

[a] *Graduate Institute of Clinical Dentistry, School of Dentistry, National Taiwan University, Taipei, Taiwan*
[b] *Department of Dentistry, National Taiwan University Hospital, College of Medicine, National Taiwan University, Taipei, Taiwan*
[c] *Division of Oral Pathology, Department of Oral and Maxillofacial Surgery, School of Dentistry, University of Washington, Seattle, USA*
[d] *Graduate Institute of Oral Biology, School of Dentistry, National Taiwan University, Taipei, Taiwan*

Received 8 November 2013; accepted 27 November 2013

KEYWORDS
atrophic glossitis;
burning sensation;
Green and King index;
iron deficiency anemia;
Mentzer index;
oral manifestation

Background/Purpose: Iron deficiency anemia (IDA) is the most common type of anemia. This study evaluated whether IDA patients had specific oral manifestations and a particular blood profile compared to normal controls.
Methods: The oral manifestations and mean red blood cell (RBC) count, corpuscular cell volume, RBC distribution width, Mentzer index, and Green and King index as well as blood concentrations of hemoglobin, iron, total iron binding capacity, vitamin B12, folic acid, and homocysteine in 75 IDA patients and in 150 age- and sex-matched healthy controls were measured and compared.
Results: IDA patients had significantly higher frequencies of all oral manifestations than healthy controls ($p < 0.001$ for all), in which burning sensation of oral mucosa (76.0%), lingual varicosity (56.0%), dry mouth (49.3%), oral lichen planus (33.3%), and atrophic glossitis (26.7%) were the five leading oral manifestations for IDA patients. Moreover, IDA patients had significantly lower mean hemoglobin level, RBC count, corpuscular cell volume, Mentzer index, iron level, and vitamin B12 level ($p < 0.001$ for all except $p = 0.003$ for vitamin B12) as well as significantly higher mean RBC distribution width, Green and King index and total iron binding capacity level ($p < 0.001$ for all) than healthy controls. However, no significant difference in

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

* Corresponding author. Department of Dentistry, National Taiwan University Hospital, 1 Chang-Te Street, Taipei 10048, Taiwan.
E-mail address: andysun7702@yahoo.com.tw (A. Sun).

http://dx.doi.org/10.1016/j.jfma.2013.11.010

the mean blood folic acid or homocysteine level was found between 75 IDA patients and 150 healthy controls.
Conclusion: IDA patients have specific oral manifestations and a particular blood profile compared to normal controls.

Introduction

Iron deficiency anemia (IDA) is the most common type of anemia, with women being more frequently affected than men. It is estimated that 20% of women of childbearing age in the USA are iron-deficient due to the chronic blood loss associated with excessive menstrual flow. Moreover, 2% of adult men are iron-deficient because of chronic blood loss related to gastrointestinal diseases, such as peptic ulcer, diverticulosis, or malignancies.[1] In addition to chronic blood loss, an increased demand for red blood cell (RBC) production during childhood growth spurts and during pregnancy, a decreased intake of iron during infancy and old-age stage, and a reduced absorption of iron in patients with total gastrectomy or celiac sprue are also possible causes of IDA.[1]

Patients with IDA may have characteristic systemic symptoms such as fatigue, weakness, lightheadedness, shortness of breath, and palpitations. Oral symptoms and signs may include atrophic glossitis (AG), generalized oral mucosal atrophy, and tenderness or burning sensation of oral mucosa.[1] However, it is still not known whether IDA patients may have specific oral manifestations and what percentages of IDA patients may have these specific oral manifestations. In this study, 75 IDA patients were collected from the oral mucosal disease clinic of National Taiwan University Hospital (NTUH). Their oral manifestations [including burning sensation and numbness of oral mucosa, dry mouth, dysfunction of taste, lingual varicosity, AG, recurrent aphthous ulcerations (RAU), and oral lichen planus (OLP)], complete blood count, and blood chemistry [including blood levels of hemoglobin (Hb), iron, vitamin B12, folic acid, and homocysteine] were inquired, examined, and recorded. These data were compared with corresponding data in 150 age- and sex-matched healthy control individuals without oral mucosal and systemic diseases to assess whether IDA patients had higher frequencies of specific oral manifestations and a particular blood profile compared to healthy controls.

Materials and methods

Participants

The study group consisted of 75 IDA patients (11 men and 64 women, age range, 20—88 years, mean 51.7 $\pm$ 14.1 years). For each patient, two age- ($\pm$ 2 years of each patient's age) and sex-matched healthy controls were selected. Thus, the normal control group consisted of 150 healthy individuals (22 men and 128 women, age range, 21—89 years, mean 52.4 $\pm$ 13.8 years). All the patients and controls were seen consecutively, diagnosed, treated, and selected in the oral mucosal disease clinic of NTUH from July 2007 to June 2013. Patients were diagnosed as having IDA when men had hemoglobin $<$ 13 g/dL, women had hemoglobin $<$ 12 g/dL, and all of them had serum iron level $<$ 60 μg/dL according to the World Health Organization criteria.[2,3] Burning mouth syndrome (BMS) was diagnosed when patients had a burning sensation of the oral mucosa in the absence of clinically apparent mucosal alterations.[4,5] Patients were diagnosed as having partial or complete AG when their dorsal tongues showed partial or complete absence or flattening of filiform papillae, respectively.[5,6] RAU was diagnosed when patients had at least one episode of oral ulcerations per month during the preceding years.[7] OLP was diagnosed according to the following criteria: (1) a typical clinical presentation of radiating grayish-white Wickham striae or papules (nonerosive OLP) combined with erosion or ulceration on the bilateral buccal or vestibular mucosa (erosive OLP); and (2) biopsy specimens characteristic of OLP, that is, hyperkeratosis or parakeratosis, a slightly acanthotic epithelium with liquefaction degeneration of the basal epithelial cells, a pronounced band-like lymphocytic infiltrate in the lamina propria, and the absence of epithelial dysplasia.[8—10] However, all IDA patients with areca quid chewing habit, autoimmune diseases (such as systemic lupus erythematosus, rheumatoid arthritis, Sjogren's syndrome, pemphigus vulgaris, and cicatricial pemphigoid), inflammatory diseases, malignancy, or recent surgery were excluded. In addition, all IDA patients with serum creatinine concentrations indicative of renal dysfunction (i.e., men, $>$131 μM; women, $>$115 μM), and who reported a history of stroke, heavy alcohol use, or diseases of the liver, kidney, or coronary arteries were also excluded.[11] Healthy controls had either dental caries or mild periodontal diseases but did not have any oral mucosal or systemic diseases. None of our IDA patients had taken any prescription medication for BMS, AG, RAU or OLP at least 3 months prior to entering the study.

According to the aforementioned diagnostic criteria, the 75 IDA patients included 22 with OLP only, 19 with RAU only, 17 with AG only, 14 with BMS only, and three with both OLP and AG. For all IDA patients and healthy controls, oral manifestations including burning sensation and numbness of oral mucosa, dry mouth, dysfunction of taste, lingual varicosity, AG, RAU, and OLP were inquired, examined, and recorded. Blood samples were drawn from all patients and healthy controls for measurement of complete blood count, blood iron, vitamin B12, folic acid, and homocysteine concentrations. All patients and healthy controls signed informed consents prior to entering the study. This study was reviewed and approved by the Institutional Review Board at the NTUH.