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ORIGINAL ARTICLE

Anemia and hematinic deficiencies in oral mucosal disease patients with microcytosis

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KEYWORDS
anemia;
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Background/Purpose: Patients with microcytosis (defined as mean corpuscular volume < 80 fL) are not uncommonly found in oral mucosal disease clinics. This study assessed the anemia statuses and hematinic deficiencies in 240 oral mucosal disease patients with microcytosis.

Methods: The mean red blood cell (RBC) count, mean corpuscular volume, and RBC distribution width, as well as blood concentrations of hemoglobin (Hb), iron, vitamin B12, folic acid, and homocysteine in 240 microcytosis patients and in 240 age- and sex-matched healthy control individuals were measured and compared.

Results: Microcytosis patients had significantly lower mean Hb, iron, and folic acid levels as well as significantly higher mean RBC count and RBC distribution width than healthy control individuals. Microcytosis patients also had significantly greater frequencies of Hb, iron, vitamin B12, and folic acid deficiencies as well as of RBC number $> 5 \times 10^{12}$/L, and abnormally high homocysteine levels than healthy control individuals. Moreover, 162 (67.5%) of the 240 microcytosis patients had anemia. Of 162 anemic microcytosis patients, 87 (53.7%) had iron deficiency anemia, 61 (37.7%) had thalassemia trait (TT)-induced anemia, and 14 (8.6%) had other microcytic anemia.

Conclusion: We conclude that approximately 45%, 4%, and 5% of microcytosis patients have iron, vitamin B12, and folic acid deficiencies, respectively, and approximately 10% of microcytosis patients have abnormally high homocysteine levels. Moreover, 67.5% of 240

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microcytosis patients and 50.8% of 120 TT patients had anemia. Iron deficiency anemia is the most common type of anemia in microcytosis patients, followed by TT-induced anemia and other microcytic anemia.

Introduction

Microcytosis is defined as mean corpuscular volume (MCV) $<$ 80 fL.[1–5] The small size of red blood cell (RBC) is caused by deficiency of hemoglobin (Hb) production. Heme, iron, α-globin, and β-globin are ingredients of Hb. Therefore, severe deficiency of any one ingredient of Hb results in microcytic anemia (defined as MCV $<$ 80 fL, Hb $<$ 13 g/dL for men, and Hb $<$ 12 g/dL for women).[1–5] The causes of microcytic anemia are a lack of iron delivery to the heme group (iron deficiency anemia, IDA), a lack of α-globin or β-globin synthesis (thalassemia minor or major), restricted iron delivery to the heme group (anemia of inflammation), and defects in the synthesis of the heme group (sideroblastic anemias).[1]

In our oral mucosal disease clinic, patients with atrophic glossitis (AG), burning mouth syndrome (BMS), oral lichen planus (OLP), recurrent aphthous stomatitis (RAS), oral submucous fibrosis, and other oral mucosal diseases are frequently encountered.[2–26] For AG, BMS, OLP, RAS, and oral submucous fibrosis patients, complete blood count, serum iron, vitamin B12, folic acid, and homocysteine are frequently examined to assess whether these patients have anemia or hematinic deficiencies.[2–22] In this study, we collected 240 oral mucosal disease patients with microcytosis. Their complete blood counts, serum iron, vitamin B12, folic acid, and homocysteine levels were examined and compared with the corresponding data of 240 age- and sex-matched healthy control individuals. The purposes of this study were to study the anemia statuses and hematinic deficiencies in these 240 microcytosis patients, to assess whether all microcytosis or thalassemia trait (TT) patients had anemia, and to find out what the common types of anemia in oral mucosal disease patients with microcytosis were.

Materials and methods

Participants

In this study, 240 (46 men and 194 women, age range 20–88 years, mean 52.4 $\pm$ 15.5 years) patients with microcytosis were collected in the oral mucosal disease clinic of National Taiwan University Hospital (NTUH). For comparisons, 240 age- ($\pm$2 years of each patient's age) and sex-matched healthy control individuals (46 men and 194 women, age range 20–88 years, mean age 53.3 $\pm$ 14.4 years) were also included in this study. All microcytosis patients and control individuals were seen consecutively, diagnosed, and treated in the Department of Dentistry, NTUH from July 2007 to July 2016. 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 or EOLP); 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.[2,13] RAS was diagnosed when patients had at least one episode of oral ulcerations per month during the preceding years.[3–7] Patients were diagnosed as having partial or complete AG when their dorsal tongues showed partial or complete absence or flattening of filiform papillae, respectively.[8,21] BMS was diagnosed when patients had a burning sensation of the oral mucosa in the absence of clinically apparent mucosal alterations.[12,22] However, microcytosis 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 microcytosis 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.[27] Healthy control individuals had either dental caries, pulpal disease, malocclusion, or missing of teeth, but did not have any oral mucosal or systemic diseases. None of our included microcytosis patients had taken any prescription medication for BMS, AG, RAS or OLP at least 3 months before entering the study.

According to the aforementioned diagnostic criteria, 240 microcytosis patients included 81 with AG, 72 with BMS, 34 with OLP, 15 with RAS, 35 with both RAS and AG, and three with both RAS and OLP. The blood samples were drawn from all microcytosis patients and healthy control individuals for measurement of complete blood count and serum iron, vitamin B12, folic acid, and homocysteine concentrations. All microcytosis patients and healthy control individuals signed the informed consents before entering the study. This study was reviewed and approved by the Institutional Review Board at the NTUH.

Determination of complete blood count and serum iron, vitamin B12, folic acid, and homocysteine concentrations

The complete blood count and serum iron, vitamin B12, folic acid, and homocysteine concentrations were