

White tongue as a manifestation of diverse skin diseases.

Abstract:

Background:

The mouth, along with tongue, represent a site for important dermatologic disorders and could be the earliest involved site in many systemic conditions.

Objective:

To delineate and evaluate the possible etiologies in patients presenting with white tongue, early or during the course of their predisposed diseases and providing a path for dealing with this condition.

Patients and methods:

In this **observational descriptive study** that was carried out during the period from 2013 to 2021, twenty three patients with white tongue were included. Full history and clinical, systemic and cutaneous, examination were performed aiming to delineate the specific diagnosis. Additional general investigations and skin biopsy were done when it was needed.

Results:

Twenty three patients, 13 (56.5%) males and 10 (43.5%) females, suffering from white tongue were enrolled in the present study. Their age at presentation was ranged from 16-50 years with mean 37.4 ± 9 years. Symptomatic white tongue was the presenting complaint in 19 (82.6%) patients and the symptoms ranged from mild oral discomfort to sever oral burning and soreness that interferes with oral functions. This study highlighted that lichen planus was the major disease predisposed to the white tongue in (56.52%) of patients followed by Behcets disease (13.04%), psoriasis (8.7%), oral candidiasis (8.7%), acrodermatitis enteropathica (8.7%) and pemphigus in (4.34%) cases. Associated cutaneous lesions were found in 78.3% of patients where in many of them, the rash was mild and discovered accidentally on routine examination.

Conclusion:

White tongue is not uncommon complaint with possible important and serious underlying causes. The current study showed that lichen planus, Behcets disease, psoriasis, oral candidiasis, acrodermatitis enteropathica and pemphigus can manifested as white tongue

either initially and/or during the course of the disease. Hence, dermatologists and oral physicians should be aware for this distinguished clinical observation.

Keywords: white tongue, lichen planus, Behcets disease ,psoriasis, oral candidiasis.

Introduction:

The mouth is a mirror reflecting health or disease. Along with tongue, the mouth represents a site for dermatologic disorders and could be the earliest involved site in many systemic conditions [1].

Normally, the tongue is pink in color and discolored tongue had been reported in many disorders. Complete or partial white coating of the tongue can be seen in furred tongue which is a common benign condition commonly observed in smokers and those with poor oral hygiene [2]. Also, in geographic tongue, mixed red and white irregular and sharply demarcated patches appeared on the dorsum of the tongue [3]. Infection, vitamin deficiency and psoriasis are some of the reported association [4].

Oral candidiasis is an opportunistic infection of the oral cavity caused by overgrowth of *Candida albicans*. It can be acute or chronic. Acute pseudomembranous candidiasis is manifested by loosely adherent, white pseudomembrane coating which can be easily scraped off with gauze while chronic hyperplastic candidiasis can manifest as whitish plaques that cannot wiped off, and are usually located on the buccal mucosa and tongue [5].

Lichen planus is a chronic disease with proposed autoimmune etiology affecting skin, hair, nail and mucosal tissues in different clinical forms [6]. The plaque-like variant can be presented as irregular, raised white plaque on the dorsum of the tongue [7]. Behçet disease is a chronic relapsing multi systemic disorder which can affects any body organ [8]. Oral aphthous ulcer covered with a white-yellow pseudo membrane that commonly occurred in buccal mucosa, and tongue, are usually the earliest sign of Behçet disease [9].

Psoriasis is a common cutaneous disease with an incidence of 2 to 3% in the general population [10]. Although oral lesions of psoriasis are matter of controversy, an association had been postulated between psoriasis with geographic, and fissured tongue [11]. Zinc deficiency can be divided into congenital so called acrodermatitis enteropathica and acquired. Orally, zinc deficiency can be manifested as erythematous, erosive and crusted lesions on the mouths and tongues [12]. Pemphigus vulgaris is a rare, chronic autoimmune disease with substantial morbidity and mortality in which easy ruptured blisters causing painful erosion and ulceration which can affect the buccal mucosa and tongue [13].

Other condition that may be presented as white tongue is oral hairy leukoplakia presenting as asymptomatic hyperkeratotic white plaque commonly occurring on lateral tongue in human immunodeficiency virus (HIV) patients and oral squamous cell carcinoma [14].

Oral manifestations may be the first presenting sign for the serious systemic and dermatologic diseases ranging from autoimmune blistering disorders with the associated substantial morbidity and mortality particularly in pemphigus vulgaris and cicatricial pemphigoid, to many chronic gastrointestinal diseases with their debilitating and chronic courses such as Crohn's disease and ulcerative colitis. In addition, the significance of muco cutaneous manifestation is quite obvious in many hematologic diseases ranging from mild anemias to more serious malignancies such as leukemia and multiple myeloma. Renal diseases, diabetes mellitus and nutritional deficiencies other than vitamin c can also present themselves in the mouth with different clinical presentation Thus ,the mouth ,along with mouth, provides easy accessible window for diagnosing of many systemic diseases ,the clinician should be aware about it[1].

So the aim of the present study to delineate and evaluate the possible etiologies in patient presenting with white tongue early or during the course of their predisposed diseases.

Patient and Methods:

In this **observational descriptive study**, twenty-three patients suffering from white tongue were enrolled during the period from 2013-2021 years. The study followed the Declaration of Helsinki Principles and informed consent was obtained from each patient after explanation of the nature of the study. Close-up photographs were taken at the same place with constant distance and illumination. A full history for every patient covering the duration and progression of disease with the associated cutaneous and systemic diseases was obtained. In addition, Personal oral hygiene history and family history of autoimmune diseases were also reviewed with patients.

In each patient, the mouth was carefully examined with appropriate light source. When needed, tongue depressor and sterilized gauze were used for tongue manipulation and stability. Careful inspection of oral mucosal site including tongue, buccal mucosa and palate for any abnormality in form of discoloration, swelling, ulceration, and vesiculation were performed. Other mucosal site including eyes and genital mucosa, and skin, hair and nails were also involved in examination in best effort for revealing any associated lesions to reach diagnosis. The lymph nodes were also inspected and palpated. Biopsy was done

in doubtful cases aiming to determine the specific diagnosis. Additionally, 10% potassium hydroxide (KOH) examination was done either to rule out or to confirm the diagnosis of oral candidiasis.

Statistical package for social science (SPSS) version 23 was used for data input and analysis. Data were statistically described in terms of mean, frequencies (no.of cases), standard deviation (SD), male to female ratio and percentage (%).

Results:

Twenty three patients, 13 (56.5%) males and 10 (43.5%) females, suffering from white tongue during eight years' time period were enrolled in the present study. Their age at presentation was ranged from 16-50 years with mean 37.4 ± 9 years. The frequency of the observed diseases associated with white tongue presentation in correlation with other oral mucosal and cutaneous involvement was illustrated in table (1). Symptomatic white tongue was the presenting complaint in 19 (82.6%) patients and the symptoms ranged from mild oral discomfort with largely cosmetic impact to severe oral burning and soreness that interferes with oral functions.

Solitary white tongue discoloration without other oral mucosal lesions was observed in 17(74%) patients while in the remaining 6(26%) patients, minimal lesions distributed elsewhere in their mouths. Lichen planus was the most frequent disease presented as white tongue in 13(56.52%) patients where white tongue precedes cutaneous involvement in 7(53.8%) patients and was the sole manifestation of the lichen planus without other oral or skin involvement in 4 (30.8%) patients (Figure1). Scaly discolored lips and other characteristic skin involvement was found in 9 (69.2%) supporting the diagnosis of lichen planus in many patients. Behcets disease was the second cause predisposing for white tongue in 3 (13.04 %) patients, the tongue was the only oral mucosal site involved in all 3 presenting patients, the other oral mucosal sites were almost clear (Figure 2). In all 3 patients, recurrent oro-genital ulceration was documented. The average duration of Behcets disease was 5 years and the white tongue developed during the course of disease on frequent follow up of those patients.

Psoriasis as a cause of white tongue was observed in 2 (8.7%) patients (Figure 3). Typical but accidentally discovered psoriatic lesions, while neglected by those patients, had been detected on the scalp, extensors or flexors on full skin examination yielding a path to the diagnosis. The average duration of white tongue in those patients was 3 years period and was the only oral mucosal site involved. The patient unsure which one start earlier, the cutaneous disease or the white tongue although both patients state the white tongue start from their early lives. The patients received different diagnoses and tried different pharmacologic treatment with non-satisfactory response.

Oral Candidiasis was recorded in 2 (8.7%) of the presented white tongue patients, the buccal and gingival mucosa were also involved in one patient. The full history revealed pemphigus in one patients on large dose oral prednisolone with minimal skin lesions while the other patient, with poor oral hygiene had chronic white tongue course, no underlying diseases had been detected and KOH scraping showed pseudo hyphae.

Acrodermatitis enteropathica was recorded as a cause of white tongue discoloration in 2 (8.7%) patients (Figure 4). The disease presented since early childhood and white tongue with angular stomatitis appeared during the course of the disease. In addition to tongue involvement, gingivitis, alopecia, dry exerotic skin, thinning of the finger nails and psoriasiform, and burn like dermatitis lesions had been observed.

Lastly, one (4.34%) case of pemphigus as a cause of white tongue was noticed (Figure 5). Upon careful skin examination, minute vesicle and ulceration were seen elsewhere in the skin which paid little attention by the patient. The white precedes the cutaneous manifestations.

Table (1): The frequency of white tongue among different skin diseases.

Disease	Patients		Total No.(%)	Site		
	Male No.(5)	Female No.(%)		Tongue only No.(%)	Tongue +Other oral sites No.(%)	Cutaneous No.(%)
Lichen planus	6 (46.2)	7 (53.8)	13(56.52)	11(84.6)	2(15.4)	9(69.2)
Behcets disease	2 (66.7)	1 (33.3)	3 (13.04)	3(100)	none	3(100)
Psoriasis	2(100)		2 (8.7)	2(100)	none	2(100)
Candidiasis	1(50)	1(50)	2(8.7)	1(50)	1(50)	1 (50)
Acrodermatitis enteropathica	2(100)		2(8.7)		2(100)	2(100)
Pemphigus		1(100)	1(4.34)		1(100)	1(100)
Total	13 (56.5)	10(43.5)	23 (100)	17(74)	6(26)	18(78.3)



Figure (1): Fifty years old male with lichen planus showing white tongue (A) and the characteristic buccal reticular network (B).



Figure (2): Thirty-seven years old male with Behcets disease showing white tongue and aphthous ulcers on the lateral tongue border.



Figure (3): Thirty-eight years old female with psoriasis showing white tongue.



Figure (4): Sixteen years young male with acrodermatitis enteropathica showing white tongue with periorificial dermatitis.



Figure (5): Forty-seven years old female with pemphigus vulgaris showing white tongue and crusted lip.

Discussion:

For centuries, in traditional Chinese medicine, the tongue color and topography were paramount area reflecting the health status of the individual and provide a path for diagnosis and prognosis of many diseases [15]. Thus, Examination of the tongue can provide a useful clinical evidence to several systemic diseases and local abnormalities. Hence, it is important for the clinician to be familiar with disorders affecting the tongue

[2].Normally, the dorsum of the tongue has variable appearance which is either pinkish or covered with thin white coating [16].

Too many terms in oral medicine which is not a diagnosis and only applied to search for etiologies behind, like desquamative gingivitis, erythroplakia and leukoplakia, similarly, white tongue can be applied for generalized whitish discoloration of the dorsum of the tongue representing an umbrella that cover many important and serious etiologies.

To best of our knowledge, the present study evaluating white tongue as a symptom developing early and / or during the course of predisposed diseases is the first published study with informative approach in dealing with commonest causes of not uncommon complaint in dermatology and oral medicine clinics.

In the present study, the diseases predisposed to white tongue were in the following orders: lichen planus (56.52%), Behcets disease (13.04%), psoriasis (8.7), oral candidiasis (8.7%), acrodermatitis enteropathica (8.7%) and pemphigus (4.34%).

Lichen planus is an inflammatory disorder with chronic course and suggested autoimmune etiology. It has different oral presentations with reticular pattern is the commonest type [17]. In the present study, white tongue was the only oral manifestation of lichen planus in most patients, a finding that is in contrary with many previously reported studies where the buccal mucosa and gingiva were the mostly involved sites [18,19].

Behcets disease is not uncommon in Iraqi population. It is a chronic autoimmune disorder with recurrent oral and genital ulceration, skin lesions inform of erythema nodosum and acneform lesions, and eye lesions inform of uveitis and hypopyon, with ability to affect many organ systems including cardiovascular, nervous and gastrointestinal systems [20,21].The mainly reported oral manifestation of Behcets disease is the oral aphthous ulcer covered with a white-yellow pseudo membrane that commonly occurred in buccal mucosa, and tongue [9].As far as we know, white tongue developing early or during the course of the Behcets disease represents a distinct manifestation that had never been described in previous studies in which the patients present with complete whitish discoloration of the dorsum of the tongue, this finding should be kept in mind when evaluating a patient with white tongue.

Psoriasis is a common skin disorder with heterogeneous clinical presentations and predisposing factors [22]. Rare cases of intraoral psoriasis had been reported. The first case of biopsy proven oral psoriasis was diagnosed by Oppenheim in 1903 [23]. The oral manifestations of psoriasis are arguable subject because many common oral inflammatory disorders have similar clinico-pathologic criteria. Also, it may appear as coincidental finding [24].In 2 controlled studies evaluating tongue lesions in 200 and 207 psoriatic patients from 2 different ethnic groups, fissured tongue and benign migratory glossitis were the two most commonly recorded findings [24,25]. None of these studies reported white tongue as oral manifestation of psoriasis. Oral psoriasis presented as persistent whitish lesion of the tongue had been reported in association with cutaneous

lesions in single case report [26]. So, the current study presents the white tongue as unique intra oral psoriatic lesions that should be looked for and added to other oral manifestation of psoriasis.

In the present study, oral candidiasis was observed as a cause of white tongue in 2 patients. This finding correlates with other report as oral candidiasis considered as a well-recognized cause of white coated tongue in both acute pseudomembranous and chronic hyperplastic type [5]. As many oral diseases can be complicated by oral Candidiasis, either due to immune suppressive treatment or due to the associated pain while trying proper oral hygiene, the diagnosis of oral candidiasis was made by exclusion with careful history and examination that reveal one of the presenting patients had pemphigus who continues to receive large dose of prednisolone that predispose the patient to candidal infection in agreement with another report [5].

Acrodermatitis enteropathica is rare, congenital disorder inherited in autosomal dominant pattern caused by impaired absorption of zinc characterized by scaly crusted plaque with ulceration in acral and periorificial distribution, alopecia and nail abnormalities [27]. In the present study, burn like dermatitis, that observed in the acrodermatitis enteropathica patients, had also been described in association with zinc deficiency in earlier study by Sharquie et al [28]. Although zinc deficiency was found to be associated with many oral problems such as recurrent aphthous stomatitis, burning mouth syndrome, atrophic glossitis, xerostomia and, erythematous, erosive and crusted lesions on the mouth and tongue [29] but none of the available studies described white tongue in acrodermatitis enteropathica. Thus, this study can send a message that white tongue can be a feature of acrodermatitis enteropathica even if it's not early presentation but could be developed later and could be sign of noncompliance to treatment.

Well known presentation of pemphigus vulgaris is painful and slow to heal buccal or palatal mucosal erosion while intact blisters are difficult to be found as the blisters are flaccid and easily ruptured [30]. Many rare presentations of pemphigus vulgaris had been described in the literatures including multiple oral pustules involving the tongue, buccal mucosa, palate, and the gingiva, [31] multiple cutaneous pustules [32] and alopecia [33]. White tongue as presentation of oral pemphigus vulgaris represent a unique manifestation that should alert the physician for this serious disorder.

The present work had introduced the tongue as a mirror reflecting serious dermatologic disorders. With exception of oral candidiasis and, the white tongue should be considered as new descriptive term similar to many other non-diagnostic term and the physician should be able to specify the etiologies gone behind it.

Conclusion:

White tongue is not uncommon problem in dermatology clinic with little emphasis on its etiologies. The present study recorded that lichen planus, Behcets disease, psoriasis, oral candidiasis, acrodermatitis enteropathica, and pemphigus were the main responsible

disorders causing white tongue. It is important for both dermatologist and oral physician to be carefully looked for and analyzed the predisposing disease for white tongue.

Ethical Approval:

As per international standard or university standard ethical approval has been collected and preserved by the authors.

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UNDER PEER REVIEW