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2022년 8월

박사학위 논문

Clinical characteristics and  
tongue diseases of patients with  
tongue symptoms

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박 재 만

# Clinical characteristics and tongue diseases of patients with tongue symptoms

혀 증상을 갖는 환자의 임상적 특징 및 혀 질환

2022년 8월 26일

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# Clinical characteristics and tongue diseases of patients with tongue symptoms

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이 논문을 치의학 박사학위신청 논문으로 제출함.

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## 초록

### 혀 증상을 갖는 환자의 임상적 특징 및 혀 질환

박 재 만

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**연구목적:** 혀 증상을 주소로 내원하는 환자들의 임상적 특징과 혀 질환을 분석하기 위하여 본 연구를 시행하였다.

**연구대상 및 연구방법:** 2021년 1월 1일부터 2021년 12월 31일까지 조선대학교 치과병원에 내원한 혀 증상을 주소로 내원한 환자를 대상으로 하였다. 전자의무기록(Electric Medical Record, Dentopinformation Technology Co., Seoul, Korea)에서 ‘한국표준질병사인분류’의 혀와 관련된 진단 코드명을 갖는 환자 491명(남자 139명, 여자 352명)을 분석하였다.

**결과:** 한국표준질병사인분류를 이용한 혀 질환의 진단명을 분석한 결과, glossopyrosis(44.8%), painful tongue(15.2%)이 높은 비율을 나타내었다. 491명 중 남자는 139명(28.3%), 여자는 352명(71.7%)이었으며 평균연령은 58.1세 였다. 전신질환은 순환계통의 질환(27.0%)과 내분비, 영양 및 대사질환(13.7%)을 가진 환자가 많았다. 혀 증상은 불편감 58명(6.6%), 통증 329명(37.3%), 지각이상 10명(1.1%), 작열감 222명(25.1%), 미각이상 25명(2.8%), 건조감 110명(12.5%), 갈라짐 57명(6.5%), 기타 72명(8.2%)으로 조사되었다. 혀 증상이 있는 부위는 전방 18.1%, 측방 24.9%, 후방 2.1%, 배면 24.9%, 복면 7.5% 그리고 전체가 22.4%였다. 혀질환의 임상적 진단명은 구강작열감증후군(44.9%)과 캔디다증(23.2%)이 높은 비율을 나타내었다.



**결론:** 허 증상을 갖는 환자들은 다양한 허 질환들을 나타내었다, 허 증상은 평균 50대 이상의 여성에서 자주 발현되며, 구강작열감증후군과 캔디다증과 같은 질환이 많았다.

**주제어:** 구강작열감증후군, 캔디다증, 허 증상

## I. Introduction

The tongue, which is called the mirror of the digestive system, is relatively easy to observe and is an important organ that provides useful information about the patient's general health status. The tongue is the most active and sensitive tissue among various tissues in the oral cavity. It has taste buds, so you can taste it, and it plays an important role in food intake, mastication, swallowing, and speech movement. It also helps to maintain the position of the teeth against the pressure of the lips and cheeks[1].

The tongue is formed during the development of the outside of the face from 4 to 6 weeks of gestation, and is a muscular organ composed of the extrinsic muscle of tongue involved in movement and the intrinsic muscle that deforms the shape of the tongue. Since only one end of the tongue is attached to the bone and many muscles intersect intricately, the shape and size of the tongue can be quickly changed freely and exercised. The movement of the tongue is controlled by the proprioceptive reflex because there is a muscle spindle in the muscle of the tongue. It is suitable for rapid exercise rather than exercise in which tension is maintained[2].

The tongue can be easily examined, but a thorough medical history examination is required by the dentist to detect abnormal findings. Diseases of the tongue are very diverse, and Mangold et al. [3] identified vascular and lymphatic lesions, reactive and inflammatory processes, infections, premalignant lesions, malignant lesions and signs of systemic disease as diseases that occur in the tongue in a literature review.

Common tongue diseases include developmental abnormalities such as microglossia, macroglossia, ankyloglossia, bifid tongue, geographic tongue, black hairy tongue, fissured tongue, benign migratory glossitis, varices, herpes simplex and varicella zoster virus infections, ulcerations,

leukoplakia, oral lichen planus, candidiasis, etc. Benign and malignant tumors such as fibroma and squamous cell carcinoma also occur, and tongue coating, fissured tongue, and glossodynia are common tongue diseases and symptoms that are frequently encountered clinically[2].

The tongue is an important organ in the oral cavity, and various diseases of the tongue appear due to local or systemic causes. However, studies on the clinical characteristics and tongue diseases of patients with tongue symptoms are rare, so this study was conducted.

## II. Materials and Methods

### 1. Study subjects

The subjects were patients who visited Chosun University Dental Hospital with tongue-related symptoms from January 1, 2021 to December 31, 2021. 491 patients (139 males, 352 females) with diagnostic code related to the tongue using the 'Korean Standard Classification of Disease(KCD)-8, 2021' on the Electronic Medical Record (EMR, Dentopinformation Technology Co., Seoul. Korea) 352) were analyzed(Table 1). The age was classified into (1) less than 20 years old, (2) 20 years or more and less than 30 years old, (3) 30 years or more and less than 40 years old, (4) 40 years or more and less than 50 years old, (5) 50 years or more and less than 60 years old, (6) 60 years or more and less than 70 years old, (7) 70 years or more and less than 80 years old, and (8) 80 years old or more(Table 2). This study was conducted with the approval of the Institutional Review Board of Chosun University Dental Hospital(CUDH1RB-2201-001).

### 2. Study methods

Based on the patient's medical records included in the study, the classification of diagnosis of tongue disease by the KCD, distribution according to gender and age group, distribution of systemic disease, characteristics of tongue symptoms, sites of tongue symptoms, classification of clinical diagnosis of tongue symptoms, distribution of clinical diagnosis of tongue symptoms according to age group were investigated.

#### Distribution of systemic diseases

Systemic diseases were classified based on the KCD, and cases with

multiple systemic diseases were also included in the survey.(Table 3).

#### Characteristics of tongue symptoms

Tongue symptoms were classified into tongue discomfort, pain, paresthesia, dyesthesia, anesthesia, burning sensation, dysgeusia, dryness, cleavage, and others. Cases with two or more symptoms were also investigated as plural(Table 4).

#### Sites of tongue symptoms

Areas with tongue symptoms were investigated. The anterior including the tip of the tongue, lateral, posterior, dorsal, ventral, and all were classified into 6 regions, and multiple investigations were performed. There was no distinction between left and right(Table 5).

#### Classification of clinical diagnosis of tongue symptoms

The clinical diagnosis of tongue symptoms was classified into malignant neoplasm, benign neoplasm, leukoplakia, ulcerations, fissured tongue, geographic tongue, median rhomboid glossitis, burning mouth syndrome, ankyloglossia, oral lichen planus, candidiasis, and others (uncertain) based on EMR analysis.

Cases with more than two clinical diagnoses were also investigated as multiples(Table 6).

#### Distirbution of clinical diagnosis of tongue symptoms according to age group

By examining the clinical diagnoses recorded in EMR, the ratio of clinical diagnoses appearing by age group was investigated. Cases with more than two clinical diagnoses were also investigated as multiples(Table 7).

### III. Results

#### 1. Classification of diagnosis of tongue disease

As a result of analyzing the diagnosis of tongue disease using KCD, glossopyrosis (44.8%), painful tongue (15.2%), benign neoplasm of tongue (7.1%), leukoplakia and other disturbances of oral epithelium, including tongue (5.6%), ulceration(traumatic) of tongue (4.1%), open wound of tongue and floor of mouth (3.9%), geographic tongue (1.8%), fissured tongue (1.8%), tongue tie (1.4%), malignant neoplasm of tongue, unspecified(1.2%), etc., appeared in the order of the highest percentage(Table 1).

#### 2. Distribution according to gender and age group

34 (6.9%) were under the age of 20, 8 (1.6%) were aged 20 to 29, 29 (5.9%) were aged 30 to 39, 44(9.0%) were aged 40 to 49, 94(19.1%) were aged 50 to 59, 146 (29.7%) were aged 60 to 69, 89 (18.1%) were aged 70 to 79, and over 80 years of age were 47 (9.6%).

Of the 491 patients, 139 (28.3%) were male and 352 (71.7%) were female, and the average age was 58.1 years(Table 2).

#### 3. Distribution of systemic diseases

As a result of investigating the distribution and ratio, there were 14 systemic diseases.

There were 2 patients with certain infections and parasites diseases(0.3%), 32 patients with neoplasm(4.3%), 6 patients with disease of the blood and blood-forming organs and certain disorders involving the immune mechanism(0.8%), 101 patients with endocrine, nutritional and metabolic diseases(13.7%), 23 patients with mental and behavioral disorders(3.1%), 26 patients with disease of the nervous system(3.5%), 3

patients with disease of the eye and adnexa(0.4%), 9 patients with disease of the ear and mastoid process(1.2%), 199 patients with disease of the circulatory system(27.0%), 18 patients with disease of the respiratory system(2.4%), 60 patients with disease of the digestive system(8.1%), 10 patients with disease of the skin and subcutaneous tissue(1.4%), 71 patients with disease of the musculoskeletal system and connective tissue(9.6%), 18 patients with disease of the genitourinary system (2.4%)(Table 3).

#### **4, Characteristics of tongue symptoms**

There were 58 patients with tongue discomfort(6.6%), 329 patients with pain(37.3%), 10 patients with paresthesia(1.1%), 222 patients with burning sensation(25.1%), 25 patients with dysgeusia(2.8%), 110 patients with dryness(12.5%), 57 patients with cleavage(6.5%), 72 patients with other symptom(8.2%)(Table 4).

#### **5. Sites of tongue symptoms**

Areas with tongue symptoms were anterior 102 (18.1%), lateral 140 (24.9%), posterior 12 (2.1%), dorsal 140 (24.9%), ventral 24 (7.5%), and 126 all(22.4%)(Table 5).

#### **6. Classification of clinical diagnosis of tongue symptoms**

The clinical diagnoses of patients with tongue symptoms were 15 patients with malignant neoplasm (2.3%), 33 patients with benign neoplasm (5.2%), 17 patients with leukoplakia (2.7%), 42 patients with ulcerations (6.6%), 29 patients with fissured tongue (4.5%), 9 patients with geographic tongue (1.4%), 6 patients with median rhomboid glossitis (0.9%), 287 patients with burning mouth syndrome (44.9%), 5 patients with ankyloglossia (0.8%), 16 patients with oral lichen planus (2.5%), 148

patients with candidiasis (23.2%), and 32 patients with others (uncertain). Overall, burning mouth syndrome (44.9%) and candidiasis (23.2%) showed high rates.(Table 6).

#### **7. Distribution of clinical diagnosis of tongue symptoms according to age group**

As for the ratio of clinical diagnosis according to age group, ulcerations (41.2%) in those under 20 years old, benign neoplasm (25.0%) and burning mouth syndrome (25.0%) in those aged 20 to 29 were high. Burning mouth syndrome was found to be high in those aged 30 to 39(40%), in those aged 40 to 49(48.0%), in those aged 50 to 59(57.4%), in those aged 60 to 69(47.0%), in those aged 70 to 79(44.7%) and over 80 years of age(40.6%)(Table 7).



Table 1. Classification of diagnosis of tongue disease

Code	Diseases by KCD-8, 2021	Patients n(%)
C01C	Malignant neoplasm of posterior third of tongue	1 (0.20%)
C02.1A	Malignant neoplasm of border of tongue	2 (0.41%)
C02.2B	Malignant neoplasm of anterior two-thirds of tongue, ventral surface	2 (0.41%)
C02.9	Malignant neoplasm of tongue, unspecified	6 (1.22%)
D10.1A	Benign neoplasm of tongue	35 (7.13%)
K13.2A	Leukoplakia and other disturbances of oral epithelium, including tongue	27 (5.50%)
K13.2B	Erythroplakia of oral epithelium, including tongue	2 (0.41%)
K13.5B	Submucous fibrosis of tongue	1 (0.20%)
K14.0A	Glossitis	4 (0.81%)
K14.0B	Abscess of tongue	3 (0.61%)
K14.0C	Ulceration(tramatic) of tongue	20 (4.07%)
K14.1A	Geographic tongue	9 (1.83%)
K14.2	Median rhomboid glossitis	3 (0.61%)
K14.3A	Hypertrophy of tongue papillae	15 (3.05%)
K14.3B	Black hairy tongue	1 (0.20%)
K14.3C	Coated tongue	1 (0.20%)
K14.4A	Atrophy of tongue papillae	1 (0.20%)
K14.5A	Plicated tongue	17 (3.46%)
K14.5B	Fissured tongue	9 (1.83%)
K14.6B	Glossopyrosis	220 (44.80%)
K14.6C	Painful tongue	75 (15.27%)
K14.8A	Other diseases of tongue	4 (0.81%)
K14.8B	Atrophy (of) tongue	2 (0.41%)
K14.8C	Crenated (of) tongue	2 (0.41%)
K14.9A	Disease of tongue, unspecified	3 (0.61%)
Q38.1B	Tongue tie	7 (1.43%)
S01.53	Open wound of tongue and floor of mouth	19 (3.87%)
Total		491 (100%)

KCD : Korean Standard Classification of Diseases

n: number

Table 2. Distribution according to gender and age group

Age group	Male n(%)	Female n(%)	Total n(%)	Mean age(y)
<20 y	20 (14.4%)	14 (4.0%)	34 (6.9%)	7.65±5.72
20-29 y	3 (2.2%)	5 (1.4%)	8 (1.6%)	25.38±2.91
30-39 y	11 (7.9%)	18 (5.1%)	29 (5.9%)	35.45±3.02
40-49 y	17 (12.2%)	27 (7.7%)	44 (9.0%)	44.73±3.14
50-59 y	15 (10.8%)	79 (22.4%)	94 (19.1%)	55.21±2.63
60-69 y	33 (23.7%)	113 (32.1%)	146 (29.7%)	64.04±2.74
70-79 y	24 (17.3%)	65 (18.5%)	89 (18.1%)	74.22±2.64
≥80 y	16 (11.5%)	31 (8.8%)	47 (9.6%)	83.45±2.44
Total	139 (28.3%)	352 (71.7%)	491	
Mean age(y)	53.54±23.74	59.90±16.79		58.10±19.24

n: number, y: years

Table 3. Distribution of systemic diseases

Code	Systemic disease by KCD-8, 2021	Patients n(%)
N/S	Non-specific symptoms and signs	160 (21.7%)
I	Certain infectious and parasitic diseases	2 (0.3%)
II	Neoplasms	32 (4.3%)
	Diseases of the blood and blood-forming organs	
III	and certain disorders involving the immune mechanism	6 (0.8%)
IV	Endocrine, nutritional and metabolic diseases	101 (13.7%)
V	Mental and behavioural disorders	23 (3.1%)
VI	Diseases of the nervous system	26 (3.5%)
VII	Diseases of the eye and adnexa	3 (0.4%)
VIII	Diseases of the ear and mastoid process	9 (1.2%)
IX	Diseases of the circulatory system	199 (27.0%)
X	Diseases of the respiratory system	18 (2.4%)
XI	Diseases of the digestive system	60 (8.1%)
XII	Diseases of the skin and subcutaneous tissue	10 (1.4%)
XIII	Diseases of the musculoskeletal system and connective tissue	71 (9.6%)
XIV	Diseases of the genitourinary system	18 (2.4%)

KCD : Korean Standard Classification of Diseases

n: number

Table 4. Characteristics of tongue symptoms

Symptoms	Patients n(%)
Tongue discomfort	58 (6.6%)
Pain	329 (37.3%)
Paresthesia	10 (1.1%)
Anesthesia	0 (0%)
Burning sensation	222 (25.1%)
Dysgeusia	25 (2.8%)
Dryness	110 (12.5%)
Cleavage	57 (6.5%)
Others	72 (8.2%)

n: number

Table 5. Sites with tongue symptoms

Sites	Patients n(%)
Anterior	102 (18.1%)
Lateral	140 (24.9%)
Posterior	12 (2.1%)
Dorsal	140 (24.9%)
Ventral	42 (7.5%)
All	126 (22.4%)

n: number

Table 6. Classification of clinical diagnosis of tongue symptoms

Diagnostic name	Patients n(%)
Malignant neoplasm	15 (2.3%)
Benign neoplasm	33 (5.2%)
Leukoplakia	17 (2.7%)
Ulcerations	42 (6.6%)
Fissured tongue	29 (4.5%)
Geographic tongue	9 (1.4%)
Median rhomboid glossitis	6 (0.9%)
Burning Mouth Syndrome	287 (44.9%)
Ankyloglossia	5 (0.8%)
Oral lichen planus	16 (2.5%)
Candidiasis	148 (23.2%)
Others	32 (5.0%)

n: number

Table 7. Distribution of clinical diagnosis of tongue symptoms according to age group

Dx.	Age group(y)								Total
	<20 n(%)	20-29 n(%)	30-39 n(%)	40-49 n(%)	50-59 n(%)	60-69 n(%)	70-79 n(%)	≥80 n(%)	
1		1 (12.5%)			1 (0.8%)	5 (2.5%)	6 (4.9%)	2 (2.9%)	15 (2.3%)
2	4 (11.8%)	2 (25.0%)	1 (2.9%)	5 (10.0%)	2 (1.6%)	12 (6.1%)	6 (4.9%)	1 (1.4%)	33 (5.2%)
3			5 (14.3%)	1 (2.0%)	1 (0.8%)	7 (3.5%)	2 (1.6%)	1 (1.4%)	17 (2.7%)
4	14 (41.2%)	1 (12.5%)	2 (5.7%)	4 (8.0%)	4 (3.3%)	7 (3.5%)	4 (3.3%)	6 (8.7%)	42 (6.6%)
5	2 (5.9%)		3 (8.6%)	2 (4.0%)	3 (2.5%)	7 (3.5%)	9 (7.3%)	3 (4.3%)	29 (4.5%)
6			2 (5.7%)	2 (4.0%)	2 (1.6%)	2 (1.0%)	1 (0.8%)		9 (1.4%)
7			1 (2.9%)	1 (2.0%)	2 (1.6%)		2 (1.6%)		6 (0.9%)
8	1 (2.9%)	2 (25.0%)	14 (40.0%)	24 (48.0%)	70 (57.4%)	93 (47.0%)	55 (44.7%)	28 (40.6%)	287 (44.9%)
9	4 (11.8%)		1 (2.9%)						5 (0.8%)
10			1 (2.9%)	1 (2.0%)	4 (3.3%)	7 (3.5%)	1 (0.8%)	2 (2.9%)	16 (2.5%)
11			4 (11.4%)	8 (16.0%)	28 (23.0%)	50 (25.3%)	35 (28.5%)	23 (33.3%)	148 (23.2%)
12	9 (26.5%)	2 (25.0%)	1 (2.9%)	2 (4.0%)	5 (4.1%)	8 (4.0%)	2 (1.6%)	3 (4.3%)	32 (5.0%)

Dx.: Clinical diagnostic name, y: years

1. Malignant neoplasm 2. Benign neoplasm 3. Leukoplakia 4. Ulcerations  
5. Fissured tongue 6. Geographic tongue 7. Median rhomboid glossitis  
8. Burning Mouth Syndrome 9. Ankyloglossia 10. Oral lichen planus  
11. Candidiasis 12. Others

## IV. Discussion

The tongue can exhibit symptoms related to systemic diseases, and is a complex organ related to pronunciation, taste, mastication, and swallowing. In patients complaining of symptoms, lesions may be observed on the tongue, or normal findings that do not require treatment may be present. Dentists can easily examine the tongue, but diagnosis and treatment can be difficult. When making a diagnosis, it is necessary to conduct a thorough history, including the time of onset, duration, antecedent symptoms, smoking and drinking. A careful evaluation of the shape of the tongue is also important[4]. During oral examination, various diseases including bullous, ulcerative, atrophic and cystic disorders of the tongue should be differentially diagnosed, and benign and malignant lesions may also need to be identified[5].

Burning mouth syndrome is mainly related to the tongue and complains of burning, but the tongue often shows normal findings[6]. Median rhomboid glossitis is commonly associated with Candida infection, and atrophic glossitis is associated with iron, folic acid, lipoflavin, and vitamin B12 deficiency. Geographic tongue and fissured tongue are common tongue symptoms that come to the dentist and do not require treatment. Biopsy is required for benign lesions of the tongue, such as fibroma, premalignant lesions, such as leukoplakia, and malignant lesions, such as squamous cell carcinoma[2,4].

In this study, glossopyrosis, painful tongue, benign and malignant neoplasm, leukoplakia ulceration (traumatic) of tongue, open wound of tongue, plicated tongue, fissured tongue, geographic tongue, and glossitis, etc. were high rates in the classification of tongue diseases by KCD. It was found that tongue symptoms were frequently expressed in women over 50 years of age. Tongue symptoms seem to occur frequently in association with menopausal symptoms in women.

Like the face, the tongue can provide valuable clues in the diagnosis of

systemic diseases. In the examination of the tongue, the state of the body fluid balance can be known by the dry state of the tongue, and nutritional disorders can be identified by the atrophy of the lingual papilla. Tongue coatings appear in febrile and digestive disorders, and tongue ulcers may be associated with syphilis or pulmonary tuberculosis[7,8]. Changes in the tongue such as glossitis appear in patients with blood diseases, and changes in the tongue can also be observed in immune diseases. In endocrine diseases, enlargement of the tongue may be seen, and metastatic lesions may appear on the tongue due to neoplastic changes[9]. Vörös-Balog et al.[10] reported the relationship between the prevalence of tongue lesions and various systemic diseases. As a result, tongue lesions were 29.03% in diabetes mellitus, 28.63% in hypertension, 23.86% in liver disease, 22.38% in gastrointestinal disorder, 25.15% associated with heart and vascular diseases, and 20.69% associated with cancer.

In this study, systemic diseases such as disease of the circulatory system, endocrine, nutritional and metabolic disease, disease of the musculoskeletal system and connective tissue, disease of the digestive system, and neoplasms showed a high rate. It is thought that the disease of the circulatory system and endocrine, nutritional and metabolic diseases appeared at a higher rate than other systemic diseases due to common adult diseases such as hypertension and diabetes mellitus. Long-term use of antihypertensive drugs can cause oral candidiasis associated with dry mouth, and diabetes can cause discomfort and abnormal sensations in the oral cavity.

Taste and general sensations of the tongue are innervated by the facial and trigeminal nerves in the anterior two-thirds, and by the glossopharyngeal nerve in the posterior third. The sublingual nerve dominates the movement of the entire tongue, and the glossopharyngeal nerve and the vagus nerve are responsible for the tip of the tongue and the throat area. The surface of the tongue is continuous with the oral mucosa and the lower surface is smooth, but the upper surface, that is, the dorsal surface, is rough by lingual papilla and lingual tonsil. The lingual papilla is composed of four types: circumvallate papilla arranged in

an inverted V-shape on the posterior part of the back, foliate papilla composed of folds perpendicular, horizontal or intersecting to the mucosa along the side of the molar area, fungiform papilla distributed over the front of the dorsal surface in a mushroom shape, and filiform papilla uniformly distributed on the dorsal surface with tongue-shaped fine projections[2].

The tongue symptoms expressed due to these anatomical features of the tongue were varied. Pain, burning sensation, and dryness showed a high rate, and symptoms such as tongue discomfort, cleavage, dysgeusia, and paresthesia appeared. Sites of tongue symptoms showing the lateral and dorsal were many, in the order of all, anterior, ventral, posterior area. These results are considered to be related to the high ratio of glossopyrosis and painful tongue in the diagnosis of tongue disease using KCD.

The clinical diagnosis of patients with tongue symptoms showed a high rate of burning mouth syndrome and candidiasis, followed by ulcerations, benign neoplasm, fissured tongue, leukoplakia, oral lichen planus, malignant neoplasm, geographic tongue, median rhomboid glossitis, ankyloglossia, etc.

Burning mouth syndrome is a disease characterized by burning pain in the tongue or oral mucosa without specific tissue changes in the symptomatic area. A burning sensation appears in the order of tongue, alveolar mucosa, palate, buccal mucosa, accompanied by dry mouth and taste abnormalities. Burning mouth syndrome lasts for at least 4 to 6 months, and because the burning sensation mainly appears on the tongue, terms such as glossodynia, glossopyrosis, and glossalgia have also been used. Burning mouth syndrome mainly occurs in the average age of 55 to 60 years, and the male to female ratio is 1:3, and it is predominant in females[6,11,12]. In this study, burning mouth syndrome occurred most frequently in women with an average age of 58.1 years, and was the most common clinical diagnosis in patients with tongue symptoms after 30 years of age.

Candidiasis is the most common fungal infection and is caused by candida albicans, a part of the normal oral flora. Candida albicans is

particularly abundant in the posterior part of the tongue, and characteristically forms a colony on the mucosal surface. This colony can be a channel for penetration into deeper tissues when the host's immunity is compromised[13]. There are pseudomembraneous and atrophic candidiasis in acute candidiasis, and hyperplastic and atrophic candidiasis in chronic candidiasis. Angular cheilitis and median rhomboid glossitis also result from candida infection. Candidiasis is increased in dry mouth, broad-spectrum antibiotic and corticosteroid use, night denture use, smoking, infants and immunocompromised patients[14,15]. The patient complains of burning mouth, dysphasia, dysgeusia, and anorexia[16]. The incidence of oral candidiasis is increasing with the recent increase in the elderly population, so it is considered important to recognize oral candidiasis in the elderly[17]. In this study, candidiasis showed the second highest incidence rate after burning mouth syndrome in the elderly after 50 years of age.

Ulceration occurs as a result of defects in the superficial epithelium or underlying connective tissue of the oral mucosa. Acute ulcers do not last longer than 2 weeks, even with a history of relapse, and are typically painful[18]. Chronic ulcers last more than 2 weeks and reflect early symptoms of malignancy. The most common malignant tumor of oral epithelial origin is squamous cell carcinoma (SCC), which mainly occurs on the ventral and lateral borders of the tongue, the floor of the mouth, and the lower lip[19]. Most ulcerative lesions of SCC are solitary, but multiple ulcerations may be present[20]. Ulcers are frequently caused by viral, bacterial, and fungal infections, and tongue ulcers caused by herpes simplex virus (HSV) infection and candidiasis are commonly observed. Although uncommon, tongue ulcers caused by Mycobacterium tuberculosis and Treponema pallidum may also be seen in patients with tuberculosis and syphilis[18,21,22].

Immune-related recurrent aphthous ulceration (RAU) and erosive lichen planus also commonly present as ulcerative lesions of the tongue, and can also be seen in patients with leukemia and inflammatory bowel disease (IBD)[(23-26]. Trauma affecting the oral mucosa can characteristically



result in superficial ulceration, which is one of the most common oral ulcerations[27]. As such, there are various causative factors that cause tongue ulcers, and in this study, ulcers were identified as the third most common clinical diagnosis showing tongue symptoms.

Tongue diseases are diverse, and benign neoplasm such as fibroma, geographic tongue that changes the color and shape of the tongue, tongue coating and fissured tongue may or may not have tongue discomfort[28–30]. Fibroma is a benign tumor of fibrous connective tissue, and it occurs mainly in the tongue and buccal mucosa asymptotically due to the proliferation of connective tissue in response to trauma and stimulation[28]. The degree of tongue coating varies from person to person and depending on the oral environment, but increases with age. The tongue coating on the dorsal surface of the tongue is composed of exfoliated keratin, foliate papillae and food debris deposited between them, and oral microorganisms, etc., and is often associated with systemic diseases such as gastrointestinal disorders[29]. Geographic tongue is related to a decrease in keratinase enzyme, although the cause is not clear, and its shape changes over time. Fissured tongue is the most common of the developmental abnormalities of the tongue, and there may be slight pain due to inflammation of food residues in the fissured part, but it has no pathological significance and is sometimes accompanied by a geographic tongue[2,30]. Various diseases, such as benign neoplasm, fissured tongue, leukoplakia, oral lichen planus, malignant neoplasm, geographic tongue, median rhomboid glossitis, and ankyloglossia, were investigated in relation to tongue symptoms in this study. It was difficult to compare the results of the study because similar studies were rare.

The purpose of this study was to investigate the clinical characteristics and diagnoses of tongue diseases in patients with tongue symptoms. Patients with tongue symptoms presented with a variety of tongue diseases. Tongue symptoms are frequently expressed in women over 50 on average, and it was found that there are many diseases such as BMS and oral candidiasis.

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