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The Status and Prospective Study of Tongue Diagnosis in Traditional Chinese Medicine

Chong Teek Foh[1], Wong Kim Tian[1], & Yong Yii Pin[1*]

[1]Faculty of Health and Life Sciences, INTI International University, Persiaran Perdana BBN Putra Nilai, 71800 Nilai, Negeri Sembilan.

[*]**Email:** yiipin.yong@newinti.edu.my

Abstract

The diagnostic methods of Traditional Chinese Medicine (TCM) include inspection, smelling, listening, inquiry, pulse taking, and palpation. Among these, tongue diagnosis, a component of inspection, has become increasingly important, particularly during the COVID-19 pandemic, when TCM physicians often relied on tongue inspection via online consultations. This preliminary study aims to review the relationship between changes in tongue appearance and diseases of the five visceral organs. It also seeks to analyze how tongue diagnosis can enhance physicians' ability to effectively interpret tongue images. Research data were collected by searching for relevant keywords in the China National Knowledge Infrastructure (CNKI) and PubMed databases, covering the period from 2000 to 2021. Journal articles were selected based on their focus on tongue diagnosis alone in disease identification, excluding studies that incorporated pulse taking or other diagnostic methods. The results indicate that different stages of disease present with distinct tongue manifestations, which correspond to pathological changes in the visceral organs. In conclusion, guided by the principles of TCM tongue diagnosis and supported by digital technology, a comprehensive database can be developed to refine tongue diagnostic theory and establish unified, objective diagnostic criteria.

Keywords

Tongue diagnosis, Four diagnosis methods, hepatocirrhosis, gastritis

Introduction

Traditional Chinese Medicine (TCM) is grounded in the study of human physiology, pathology, and pharmacology, with a holistic understanding of the human body's relationship to the natural environment. A core feature of TCM is syndrome differentiation, which includes four primary diagnostic techniques: inspection, smelling and listening, inquiry, and pulse taking (Sihan et al., 2020). These techniques collectively guide practitioners in forming accurate diagnoses based on the foundational theories of TCM.

In modern times, however, some physicians have shifted their attention toward one specific diagnostic technique, particularly tongue diagnosis, for syndrome differentiation and

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treatment. This is rooted in the classical understanding that pathological changes within the body manifest externally (Linli, Jingmin, & Qinghua, 2019). This idea is closely aligned with the principle of "inspecting the exterior to understand the interior" in TCM, making tongue diagnosis a vital tool in evaluating internal organ function and pathological change (Yu et al., 2020).

The objective of this study is to review the relationship between changes in tongue appearance and diseases of the five visceral organs and to assess how tongue diagnosis can improve physicians' ability to interpret tongue images more effectively.

Methodology

This study utilized content from ancient classical TCM texts and national TCM textbooks used in colleges and universities, including *The Yellow Emperor's Inner Classic* and *Diagnostics in Chinese Medicine (International Standard)*.

In addition, research data were collected from online academic databases, including the China National Knowledge Infrastructure (CNKI) and PubMed, covering the period from 2000 to 2021. The inclusion criteria consisted of peer-reviewed articles that focused exclusively on tongue diagnosis in disease identification. Articles combining tongue diagnosis with pulse taking or other diagnostic methods were excluded.

The research process began with identifying and analyzing scholarly articles centered on traditional tongue diagnosis. Priority was given to studies discussing the relationship between changes in tongue appearance and diseases of the five visceral organs, such as hepatocirrhosis and gastritis (Table 1).

Table 1. Summary of Tongue Diagnosis Findings in Relation to Internal Organ Diseases

No.	Title of Analysis
1	Result of analysis on tongue condition in 51 patients with hepatocirrhosis
2	Relationship between tongue coating and types of gastritis in 178 patients
3	Relationship between tongue colour and types of gastritis in 178 patients

Results and Discussion

Traditional Chinese Medicine (TCM) physicians often use tongue diagnosis to identify diseases originating from the five visceral organs. This method enables accurate diagnosis and guides appropriate treatment and prescription plans for patients.

One example is liver disease, such as cirrhosis, a common chronic liver condition resulting from long-term or repeated damage to the liver parenchyma. It is typically characterized by progressive loss of liver function and may result in serious complications, including liver cancer and ascites, which pose significant threats to human health (Schuppan & Afdhal, 2008).

Table 2 presents the tongue characteristics of 51 patients diagnosed with hepatocirrhosis, divided into two groups: those with ascites and those without. The data show that among the 22 patients with ascites, the majority (50%) exhibited a crimson tongue with less coating, followed by 26% who had a red tongue with less coating. In contrast, among the 29 patients without ascites, the most common presentation was a dull red tongue with light coating (35%), followed by a purple tongue with light coating (24%).

Ascites syndrome develops as a consequence of liver cirrhosis and reflects the severity of the underlying disease. According to Table 2, there is a noticeable difference in tongue color between hepatocirrhosis patients with ascites and those without. Among patients with ascites, 50% exhibited a crimson-colored tongue body, indicating more advanced pathological changes. In contrast, 35% of patients without ascites predominantly presented with a dull red tongue with thin coating (Lifang, Fengzhen, & Junfu, 2008).

In Traditional Chinese Medicine (TCM), liver cirrhosis is categorized under the syndrome of "accumulation." From the TCM perspective, the liver is responsible for storing blood and regulating the tendons (Huaiping, 1998). As shown in Table 2, the majority of cirrhosis patients with ascites exhibited crimson red tongues with less coating, followed by dark red tongues, suggesting severe heat and yin deficiency. In contrast, cirrhosis patients without ascites were more likely to exhibit dark red tongues with thin coating, indicating a less advanced stage of the disease.

It is believed in Traditional Chinese Medicine (TCM) that the formation of ascites results primarily from dysfunction in the liver, spleen, and kidneys. These dysfunctions lead to the accumulation of qi, blood, and body fluids within the abdominal cavity. When the spleen fails to transform and transport water, the retained fluid may transform into fire, which in turn scorches the yin fluids (Lifang, Fengzhen, & Junfu, 2008). This pathological transformation results in yin deficiency of the liver and kidneys, leading to insufficient yin essence to nourish the tongue body. Consequently, patients with cirrhosis tend to present with a crimson red tongue and reduced coating, as shown in Table 2.

Overall, liver diseases such as cirrhosis show a strong correlation with changes in tongue appearance. Observing tongue manifestations can therefore provide valuable diagnostic insight for TCM physicians in assessing the condition and internal imbalances of patients.

Table 2. Tongue Conditions in 51 Patients with Hepatocirrhosis

Group	Pale red tongue with light white coating	Pale tongue with white greasy coating	Red tongue with light white coating	Red tongue with light yellow coating	Dull red tongue with light coating	Purple tongue with light coating	Red tongue with less coating	Crimson tongue with less coating
Cirrhosis with	1 (5%)	–	2 (9%)	1 (5%)	1 (5%)	–	6 (26%)	11 (50%)

ascites (n = 22)								
Cirrhosis without ascites (n = 29)	1 (3.5%)	2 (7%)	3 (10%)	3 (10%)	10 (35%)	7 (24%)	1 (3.5%)	2 (7%)
Total (n = 51)	2 (4%)	2 (4%)	5 (10%)	4 (8%)	11 (21%)	7 (14%)	7 (14%)	13 (25%)

Note. Adapted from Lifang, Fengzhen, & Junfu (2008)

In addition to liver-related disorders, diseases of the spleen and stomach, such as chronic gastritis, also exhibit noticeable manifestations on the tongue. Chronic gastritis is a long-standing inflammatory condition of the gastric mucosa and is considered one of the most prevalent, progressive, and often insidious gastrointestinal diseases in humans (Sipponen, Maaroos, & H.-I., 2015). In Traditional Chinese Medicine (TCM), the tongue is closely related to the spleen; thus, pathological changes in the spleen or stomach are often reflected visibly on the tongue surface.

Table 3. Relationship Between Tongue Coating and Types of Gastritis in 178 Patients *(Adapted from Yaqin & Xizhi, 2003)*

Type of Gastritis	Light White	Light Yellow	Thick White	Thick Yellow	White Greasy	Yellow Greasy	Less Coating	No Coating
Superficial (n = 102)	35 (34.3%)	23 (22.5%)	8 (7.8%)	2 (2.0%)	26 (25.5%)	5 (4.9%)	2 (2.0%)	1 (1.0%)
Atrophic (n = 45)	2 (4.4%)	3 (6.7%)	1 (2.2%)	1 (2.2%)	2 (4.4%)	1 (2.2%)	25 (55.6%)	10 (22.3%)
Reflux (n = 31)	1 (3.2%)	1 (3.2%)	9 (29.0%)	6 (19.4%)	4 (12.9%)	10 (32.3%)	0 (0.0%)	0 (0.0%)
Total (n = 178)	38 (21%)	27 (15%)	18 (10%)	9 (5%)	32 (18%)	16 (9%)	27 (15%)	11 (7%)

Based on Table 3, patients with superficial gastritis predominantly presented with light white tongue coating (34.3%). In contrast, atrophic gastritis patients mostly exhibited less tongue coating (55.6%), whereas reflux gastritis patients most frequently had yellow greasy coating (32.3%).

Table 4. Relationship Between Tongue Colour and Types of Gastritis in 178 Patients *(Adapted from Yaqin & Xizhi, 2003)*

Type	Light White	Light Red	Red	Dark Red	Purple
Superficial (n = 102)	31 (30.4%)	46 (45.1%)	15 (14.7%)	7 (6.9%)	3 (2.9%)
Atrophic (n = 45)	2 (4.4%)	3 (6.7%)	18 (40%)	16 (35.6%)	6 (13.3%)
Reflux (n = 31)	3 (9.7%)	3 (9.7%)	6 (19.4%)	11 (35.5%)	8 (25.7%)

Total (n = 178)	36 (20%)	52 (29%)	39 (22%)	34 (19%)	17 (10%)

According to Table 4, superficial gastritis patients predominantly exhibit a light red tongue color (45.1%). In contrast, atrophic gastritis patients mostly present with a red tongue color (40%), while reflux gastritis patients are more frequently associated with a dark red tongue.

These patterns indicate that different types of chronic gastritis exhibit distinct tongue features. Tables 3 and 4 demonstrate that superficial gastritis is generally associated with a light red tongue and light white coating, suggesting a milder syndrome compared to other gastritis types. In TCM theory, this is because pathogenic factors remain on the surface and have not penetrated deeply into the internal organs. Hence, the tongue retains a healthy appearance with only slight changes.

In contrast, atrophic gastritis is typically characterized by a red or dark red tongue with less coating, reflecting more severe gastric mucosal damage. Meanwhile, reflux gastritis tends to show a thick, greasy coating and a dark red tongue, indicating a longer disease course and more severe pathological changes.

According to Traditional Chinese Medicine and the classical text *Shang Han Lun Ben Zhi* (伤寒论本旨), tongue coating is primarily formed by the upward steaming of stomach qi to the surface of the tongue (Qun & Xuejuan, 2006). Therefore, variations in tongue coating thickness and color are closely related to disorders of the spleen and stomach. In reflux gastritis, the yellow, greasy, and thick coating is attributed to the invasion of pathogenic damp-heat qi. In atrophic gastritis, the red tongue with little coating suggests deficiency of stomach yin, leading to poor nourishment of the tongue body.

This study supports the TCM principle that "tongue coating is the external manifestation of stomach qi". However, the causal relationship between tongue appearance and specific disease types requires further empirical exploration in future studies.

In TCM, the five viscera—liver, spleen, heart, lung, and kidney—do not solely refer to anatomical organs, but rather to functional systems with interconnected physiological and pathological attributes. For example, the liver is functionally linked to the eyes, tendons, and internal organs via meridians, exhibiting unique manifestations under disease conditions. By contrast, in Western medicine, the liver is understood solely as an anatomical structure with defined physiological functions (Liu, Shu, Tu, Zhang, & Hong, 2017). Nonetheless, recent research suggests convergence between TCM and biomedical interpretations, especially in the observation that visceral diseases often manifest through changes in tongue color and coating.

Undoubtedly, tongue diagnosis is a critical component of TCM diagnostic methods. However, it is susceptible to subjective bias, as physicians may interpret tongue characteristics differently based on their personal experience. Additionally, environmental factors (e.g., lighting conditions) may affect the accuracy of visual tongue assessments. To overcome these limitations, artificial intelligence (AI) has been introduced to enhance objectivity in tongue diagnosis.

The integration of AI into TCM has the potential to mitigate subjectivity and improve diagnostic consistency. In 2019, the International Organization for Standardization (ISO) formally released an international standard for TCM tongue diagnosis (ISO 20498-5), which outlines a standardized digital imaging approach for capturing tongue features objectively, independent of imaging devices (Xiangyu, Songhua, Hua, & Yuying, 2020). This development reflects the growing global recognition of the clinical value of tongue diagnosis and the need for quality assurance in TCM imaging practices.

Nevertheless, current methods of tongue diagnosis still face significant limitations in clinical research. For instance, small sample sizes, as well as inconsistencies in image acquisition instruments and techniques, hinder the generalizability of findings. Furthermore, developing advanced diagnostic instruments is technically challenging, as researchers must not only capture complex tongue characteristics—including color, coating, and body features—but also ensure three-dimensional, high-resolution rendering and integrate graphics recognition technologies for accurate classification.

Thus, there remain substantial gaps in understanding the correlation between tongue diagnosis and specific diseases, which must be addressed through more robust and standardized research.

Conclusions

In summary, as the integration of AI and medical sciences continues to evolve, it is expected to bridge the conceptual divide between traditional medicine and modern technology. By combining TCM's tongue diagnosis principles with digital innovations, a comprehensive and standardized diagnostic system can be established. This will not only enhance objectivity and reproducibility but also foster the modernization and global acceptance of TCM in future clinical applications.

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