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THE TONGUE AS A MIRROR OF HEALTH: BRIDGING ANCIENT WISDOM AND MODERN DIAGNOSTICS

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Abstract

The tongue has always been an important diagnostic tool in traditional medicine. On the upper surface of the tongue, there is a red-colored coating which serves as a vital indicator of several health conditions and nutritional imbalances. Moreover, for assessing GI health, the tongue is very important because alterations in shape and color are usually indicative of digestive disorders. As far as rheumatic diseases are concerned, it remains a diagnostic marker that reflects systemic inflammation along with autoimmune reactions. One of the axes along which diagnostic accuracy might be improved would be tongue examination standardization. Diagnostic examination of the tongue holds an important place in clinical practice today. This review shall demonstrate its viability as an easily accessible and non-invasive approach towards a comprehensive assessment of health status.

Keywords

Tongue diagnostics, tongue color, tongue coatings, traditional medicine.

I. Introduction.

The tongue is a muscular organ in the mouth, used for chewing and swallowing, as well as for speech and taste. There are intrinsic muscles and extrinsic muscles that aid movement, flexibility, and control. The surface of the tongue is covered by tiny projections called papillae. Within the papillae lie taste buds, which are sensory organs responsible for sweet, salty, sour, savory, and bitter experiences. Tongue papillae are of four types: filiform (texture and friction), fungiform (taste), circumvallate (taste), and foliate (taste). The lingual artery primarily supplies blood to the tongue. The hypoglossal nerve motorically controls it. Nerves trigeminal, facial, and glossopharyngeal control functions sensory and taste of the tongue **[1].**

A healthy tongue should present a pink or light red color, indicating proper vascularization without any pathological alteration. The tongue should also be symmetrical with a smooth surface free of lesions, fissures, or proliferation and have an homogeneous texture without swelling or aberrations. In normal

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conditions, the coating consists of a thin layer whitish one made of bacteria, remnants of food, and desquamated epithelial cells. In it, however, changes appear in the form of discoloration of the tongue (yellowing and blackening or brownening), asymmetry as well as hyperplasia of the coating that suggests disturbances in oral health or general health status. The characteristics mentioned above are clinically observed and used to provide diagnostic information about both dentistry and medicine **[1,2].**

Tongue diagnosis in traditional or ancient medical practices. Chinese, Indian, Tibetan, and especially Central Asian doctors use tongue examination as a major indicator for the diagnosis of disease. Central Asian scholars such as Rasi (865–925), Abu Nasr al-Farabi (873–951) and Abu Ali Ibn Sina (980–1037) also recognized the importance of the changes in the language in the diagnosis of diseases. The ancient Greek physician and physician Hippocrates stressed that observation of language conditions can be used to identify and diagnose diseases.

The tongue evaluation dates back to the Shang Dynasty (1600 to 1000 BC) and consists of a visual inspection of the body of the tongue for vitality, color, shape, humidity, and movement, and the evaluation of the tongue coating for color, thickness, distribution and root characteristics **[3]**.

In traditional Chinese medicine(TCM), the tongue is demarcated into individual sections where each section corresponds to a particular organ. Any dysfunction in a certain organ can affect its related area of the tongue; hence, the diagnosis of the tongue is a very integral component of the medical examination. TCM theory states that the tip of the tongue is connected with the heart and lungs; the root is associated with the kidney and intestines; the left side and right side are considered to be related to either the liver and gall bladder; and central area is a

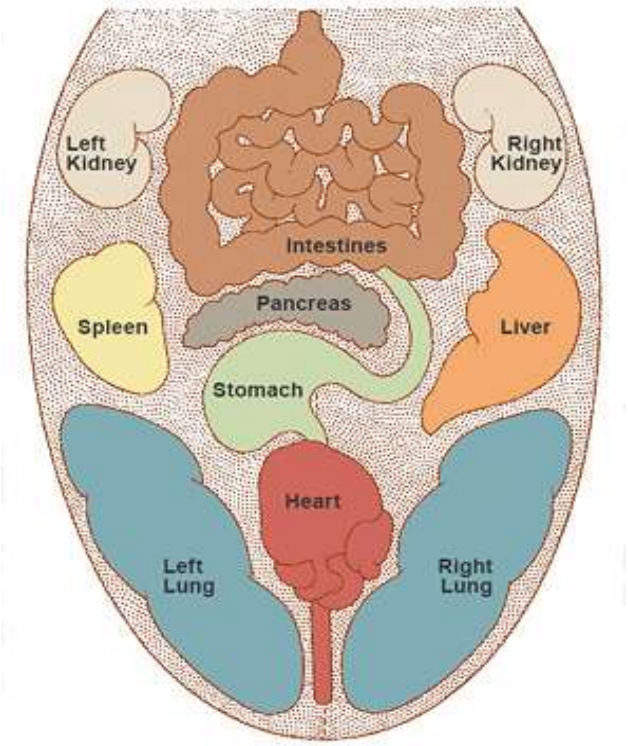

Figure 1 Schematic representation of the tongue-organ correlation map [15].

reflection of condition of the stomach. These systematic mappings enable practitioners to detect potential problems based solely on visible changes on the tongue (Figure 1) **[4]**.

The tongue's color and shape can reveal key insights about health. The color of the tongue tells about the overall health. A healthy tongue would appear pinkish with a thin white coating. Changes in color, texture, or coat may also indicate a health problem or imbalance. A red coloration of the tongue is a clinical indicator for complex health issues and nutrient deficiencies. Such appellation is closely tied to inherent physiological disturbances such as deficiencies in the fundamental nutrients like vitamin B12 and iron or states of dehydration. Besides, it may accompany raised body temperature during fever episodes or indicate streptococcal infection **[5].** The pale tongue is common in anemia, iron deficiency, or decreased blood flow. Bright red tongue points towards B12 or folate deficiencies or inflammatory conditions like glossitis. A yellow or white coating usually means fungal infections (for example, oral candidiasis), impairment in digestion, or poor oral hygiene. In more serious cases, a bluish or purple tongue may indicate hypoxia, cardiovascular conditions, or circulatory disorders **[6,7].** The tongue is one of the most important diagnostic features for GI health, and both kinds of change-morphological and chromatic-are often indicative of some underlying digestive pathology. Dorsal surface of the tongue being thick, white or yellow in color may also implicate gastritis, gastroesophageal reflux disease (GERD), or dysbiosis of gut microbiota. These coatings form from an accumulation of bacteria, anomalous particles, and inflammatory tissues contaminated by dysfunction of the digestive incidence. A smooth, glossy, atrophic red tongue can be a sign of deficiencies in any of the essential nutrients necessary for the integrity of the mucosal and GI functions- e.g., vitamin B12, folate, or iron. Swelling or scalloping on the tongue, with lateral indentations, is often attributed to the presence of malabsorption syndromes or food intolerances or chronic stress in the GI tract which reflects fluid retention or mechanical irritations by teeth. These clinical manifestations underscore the use of the tongue as a non-invasive, low-cost diagnostic tool in the recognition of systemic gastrointestinal disorders **[8,9].**

Sleep disorders associated with the deteriorating functionality of the stomach have been linked to alterations in tongue morphology; a research investigation conducted by Korean scientists revealed that the hue of the tongue body in individuals suffering from sleep disorders manifested a paler appearance in comparison to the control group, while the distribution of tongue coating in the

normal cohort was less extensive than that observed in the sleep disorder cohort **[10].**

Other tongue changes also serve as markers for diagnosis of various rheumatic diseases because they reflect systemic inflammation and autoimmune activity. Ulcerations, erythema, or glossitis may occur in the tongue during chronic inflammation due to rheumatoid arthritis (RA) or systemic lupus erythematosus (SLE). Patients suffering from Sjögren's syndrome-a rheumatic disorder with dryness-are often found to present with a dry, fissured tongue resulting from decreased salivary flow. Geographic tongue (benign migratory glossitis) has been associated with psoriasis and psoriatic arthritis; this shows an association between oral and systemic autoimmune conditions. Thus, these tongue changes indicate the importance of oral examination in the effective management of rheumatic diseases **[11,12].**

In patients with chronic kidney disease (CKD), common changes of the tongue may include dryness, fissures, and a thick white or yellow coating that usually forms due to uremic changes and reduced salivary flow. In its advanced stages, uremic stomatitis may also be observed with erythematous or ulcerative lesions. Besides, a pale tongue may indicate anemia, a common complication of CKD, while brown or black discoloration (black hairy tongue) may develop as altered microbial flora due to an accumulation of metabolic wastes. These changes indicate the role of the tongue as a non-invasive diagnostic aid for monitoring renal health and disease progression **[13,14].**

Analyzing and noticing changes of the tongue provide clues in the identification of pathological processes going on within the internal organs of the patient. Changes in its color, texture, coating, and morphology may provide early signals of more systemic problems, like those found in metabolic or inflammatory diseases. Tongue changes, in particular, require careful attention during patient evaluations to enhance diagnostic abilities and underline that the tongue is a non-invasive diagnostic tool. Incorporating this kind of observation into routine examinations improves early detection and management of health problems; this indicates that tongue diagnostics occupies an important part in clinical practice.

II. METHODS

The study undertook an evaluation of tongue diagnosis, which is practiced in traditional medicine, versus contemporary medical diagnostic practices. The study aimed to assess alignment between tongue changes in regard to the organ correlation map proposed by TCM, also attempting to study the potential of tongue color, coating, or morphology in early disease diagnosis and whatever is necessary to dispense health problems. Accordingly, 50 patients (24 males and 26 females)

aged between 18 and 77 years were selected from the departments of Rheumatology (21), Cardiology (9), Vascular Surgery (10), and Nephrology (10) as the participants through a random process. Nevertheless, two female patients refused to take part in the study. The tongue pictures of 48 patients remained with mobile devices after the interviews and clinical exams were carried out. The changes observed in the tongue images collected from the patients were scrutinized alongside the reported symptoms, while the physicians conducted the preliminary diagnosis. These preliminary diagnoses were laid out and subjected to comparative analyses against definitive diagnoses established through modern laboratory and instrumental examinations documented in their medical files. The collected responses were properly consolidated and subjected to statistical analyses for develop meaningful insight.

III. ANALYSIS OF EXPERIMENTAL RESULTS

At the conclusion of the study, the obtained results were analyzed both by individual sections and in the overall context, and categorized into three groups: those that matched, partially matched, and did not match. Specifically, in the Rheumatology department, out of 19 patients, the tongue manifestations of 14 patients were consistent with their complaints and diagnoses, while those of 5 patients showed no correlation. In the Cardiology department, the findings for 8 patients were positive, whereas those of 1 patient demonstrated no alignment. In the Vascular Surgery department, the results for 6 patients fully matched, 2 patients partially matched, and the remaining 2 patients showed no correlation. In the Nephrology department, the results for 9 patients were consistent, while those for 1 patient were inconsistent. Upon compiling the overall statistical analysis of the obtained results, it was observed that out of the total 48 patients examined, the tongue manifestations of 36 patients (75%) exhibited a precise correlation with the tongue regions associated with the affected organs. There were, however, 2 patients (4%) that exhibited partial correspondence; 10 patients (21%) exhibited no correspondence. Overall, the results were promising, confirming the possibility of preliminary conclusions regarding the organ undergoing a pathological process on observations carried out in the tongue.

In addition, inspection of the tongues of patients in the Rheumatology department introduced them to discover changes in tongue regions corresponding to the organs that overt clinical manifestations were not noted in the patients. Nevertheless, it was understood that the patients were not suffering obvious discomfort due to the affected organs. Further laboratory and instrumental diagnostic tests confirmed that the functional disorganization was present in those organs, although the overt symptoms were masked by the analgesic treatment that

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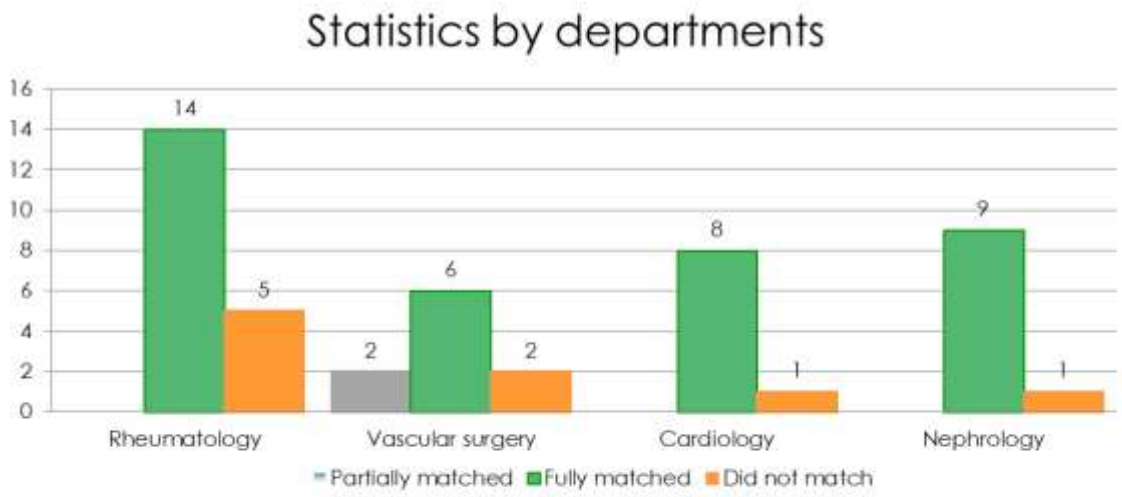
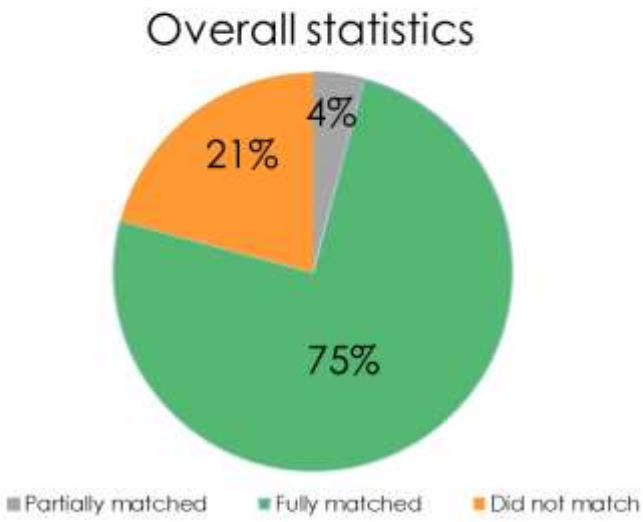
the patients had received. The early detection prevented progression of diseases into an advanced stage.





IV. SUMMARY AND PROSPECT

Summary of this Article.

Traditionally, tongue diagnosis has been regarded as a mirror that reflects the health of a person's body. On the tongue, the inflammation and metabolic processes, and pathological changes occurring within the body appear as observable markers. This allows for insights into the present state of the body. Though nowadays, due to improved, expedited, and highly informative laboratory and instrumental diagnostic techniques, which are regarded as golden standards in the modern diagnostic setting, tongue diagnosis still remains valuable. This becomes especially crucial in emergency medicine when it becomes necessary to quickly identify the required diagnostic tests, eliminating superfluous examinations. This study further elucidated and affirmed that tongue diagnosis

accordingly can provide adequate preliminary information on the condition of a patient's body and can then be an important adjunct in the practice of health practitioners.

Future Outlook.

The future for tongue diagnosis will exist on that border where traditional medical wisdom meets modern scientific progress. Through standardization of diagnostic criteria along with new-age inventions like artificial intelligence and digital imaging, more precision and objectivity in the diagnosis shall be gained. These would allow automated assessment of tongue features that would enhance reproducibility and the early diagnosis of diseases. Future research will investigate some correlation between tongue characteristics and systemic health markers, and this may include their relationship with factors describing integral microbiome analysis and genetic profiling as tools to further support clinical applicability. Large-scale studies and a collaborative approach to research among practitioners of traditional medicine with modern-day clinicians are essential in the validation of tongue diagnostics into a recognizable medical tool. The combination of ancient principles of diagnostics with modern medical science can allow tongue diagnosis to become thereby established as a validated, standard, non-invasive, inexpensive diagnostic technique for early disease detection and holistic health assessment.

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