



## Role of Tongue prints in determination of sexual dimorphism

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### Abstract:

**Background:** Human identification is of utmost significance in mass disaster, in court of law or to establish identity. Forensic odontology is gaining importance in forensic identification as oral cavity is unique. Moreover the tongue prints which are unique to individual can also be used for identification. As it has been observed that tongue has unique morphological features.

**Aim:** To identify the predominant tongue print patterns in males and females with respect to shape of the tongue, Tip of the tongue, Grooves on the dorsal surface of the tongue and the number and diameter of circumvallate papillae.

**Materials and methods:** 52 Individuals (26 males and 26 females) formed the sample for the study. Alginate impressions were taken further casts were made using the impression and casts were observed for shape of the tongue, Tip of the tongue, Grooves on the dorsal surface of the tongue and the number and diameter of circumvallate papillae for males and females.

**Results:** The most common tongue shape in male was rectangular however, in females the most common tongue shape was circular, and the most common tongue tip in males was U-shaped tongue tip and V-shaped in females. Grooves were deep in males and shallow in females. Males have more circumvallate papillae than females, and the diameter of tongue was larger in males than females.

**Conclusion:** Based on the observations of present study the tongue morphology can be used as a potential tool for determining sexual dimorphism. However, more studies with larger sample size should be conducted for validation.

**Key words:** Tongue prints, sexual dimorphism, tongue morphology.

### Introduction:

The tongue is a unique sense organ, and because of its vitality, traditional Chinese Medicine refers to it as the "Tongue of Life." It is said to be a representation of a person's dental and overall health. The tongue is the only internal organ that can be protruded from the body and easily exposed for inspection, and its shape and surface textures are unique to each individual.[1] The use of tongue prints for forensic identification is now in its early stages. The antemortem image or impression of the tongue must be available for this approach to work. It could be used to create secure forensic

dentistry identification systems.[2] When used in conjunction with methods such as cheiloscopy and rugoscopy, lingual impressions (impressions of the dorsal surface as well as the lateral borders) have proven to be beneficial in forensic dentistry identification.[3] The analysis of lingual morphological aspects preserved using the alginate moulding technique, the most reliable technique for duplicating the

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most minute details, represents a criterion with force of evidence up on uniqueness for each and every individual, with the help of which forensic dentistry identification provides information with predictive values in terms of a person's identity.[4] Tongue print has a number of advantages over other biometric technologies. It can be easily exposed for investigation because it is an internal organ, and the exposed surface has the necessary information. The texture and shape of the human body remain unchanged. It is highly shielded from the outside world and hence is unaffected by external influences.[ 5]

The present study was conducted to determine the predominant tongue print patterns in males and females with respect to shape of the tongue, tip of the tongue, grooves on the dorsal surface of the tongue and the number and diameter of circumvallate papillae.

**Materials and Methods:**

The study sample was comprised of randomly selected fifty-two participants (26 males and 26 females) within the age group of 18- 25 years, all who reported to the Department of Oral pathology and Microbiology. Only healthy individuals were included who were willing to participate and were free from any tongue related pathology.

The examination of the tongue was carried out after its prior cleaning with sterile compresses, together with frequent rinsing of the oral cavity. The impression of the tongue is taken in the relaxed position. This was done to relax the striated lingual muscle, which could have resulted in a change in the tongue's form and internal features.

Fast setting alginate was applied directly in the tongue of the individual. It is applied on the tongue in order to avoid regurgitation reflexes. This covers the lingual and lateral border of the tongue. The Class 4 Dental stone was used to replicate it. The alginate impression has the advantages of duplicating images within minutes.

The characteristic features observed on the dorsal surface of the tongue have been categorized as:

The tongue's shape is defined by TCM as a rectangle, an acute triangle, an obtuse triangle, a square, and a circle. U-shaped and V-shaped tongue tips. The Grooves are present on the dorsal surface of the tongue was categorized as deep, shallow and no grooves and the number and diameter of circumvallate papillae are among the parameters we used. (Table -1

Table 1: Criteria use in the study

1.	Shape of tongue
2.	Tip of the tongue
3.	Grooves on the dorsal surface
4.	Number and diameter of circumvallate papillae

**Results:**

The most common tongue shape in male was rectangular(10 male cases) followed by circle (8 male cases), obtuse triangle (5 male cases) and acute triangle (3 male cases) however, in females the most common circular tongue shape was observed. In 11 cases followed by obtuse triangle in 7 female cases, acute triangle in 4 female cases and rectangular in 4 female cases. In our result we found that 21 Males had U-shaped tongue tip and 5 male had V-shaped tongue tips, whilst 19 females had V-shaped and 7 female had U-shaped tongue tips. **(Figure-01)** We observed the grooves on the dorsal surface of the tongue, deep grooves were found in 14 male cases followed by shallow grooves in 7 males and 5 male cases had no grooves and deep grooves were found in 9 female followed by shallow in 12 female cases and no grooves were found in 5 females. Males have more circumvallate papillae than females, and the diameter was larger in males. (Table -2)

GENDER	MALE (26)	FEMALE (26)
Shape of tongue	rectangular > circle > obtuse triangle > acute triangle 10> 8>5>3	circle>obtuse triangle >acute triangle>rectangular 12>9>5>4
Tip of the tongue	U Shaped> V Shaped 21>5	U Shaped >V Shaped 7<19
Grooves on the dorsal surface	Deep> Shallow > no grooves 14 >7>5	Deep > Shallow > no grooves 9<12>5
Number and diameter of circumvallate papillae	More	Less

Table -2 Characteristic feature of the tongue in male and female



Figure 3: Number and Diameter of circumvallate papillae is greater in male then female



Figure 1: U-shaped Tongue in Male and V-shaped tongue in female



Figure 2: Grooves are Deep in male and shallow in female

**Discussion:**

Human identification is one of the most difficult problems that man has ever faced. The forensic odontologist's major focus is on identifying people by recognizing distinctive features in the oral architecture. It is known to be a mirror of the oral and general health. The human tongue is encased within the oral cavity and can be easily drawn out and can be easily brought out and exposed for examination and palpation. It promises to be unique and has a number of qualities that make it suited for identifying people.[6]

In terms of shape analysis, in males, the most common tongue form is rectangular followed by circle, obtuse triangle, acute triangle and square, however in females, the most common tongue shape is circle, followed by obtuse triangle, acute triangle and rectangular.

Deep, triangular medial septum reaching up to the anterior third of the dorsal surface, with the tip toward the lingual apex and the base toward its “V.” A superficial, narrow, and thin extension of the septum can be seen close to the tip. Another feature of the tongue is the existence of two thin, fibrous masses on the right side of the tongue, towards the tip, that create a “compasses.” A general “U” form is visible.[7]

The following aspects of the lingual apex analysis are disclosed as a result of the investigations carried out: Sharp V-shaped tip are characteristic to female subjects, whereas U-shaped tips were common for male.

The related grooves are randomly scattered across the dorsal surface of the tongue, with different orientations, forms, and

sizes. The general shape is trapezoidal, with a small anterior base and the large base at the level of the oral commissures. The circumvallate papillae have a higher number of papillae and a greater dimension in males than in female.

### **Conclusion:**

Based on the observations of present study the tongue morphology can be used as a potential tool for determining sexual dimorphism. However, more studies with larger sample size should be conducted for validation.

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