

# A study of lip prints among Pondicherry population

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## Abstract

**Background:** Cheiloscropy is a forensic investigation that deals with the examination of the system of furrows on the red part of human lips. Like fingerprint, lip print is also unique for every individual. But most of the crime-detecting agencies are unaware of the importance of lip print and it is not commonly attempted in identification of the suspects. **Aim:** The aim of the present study is to determine the predominant lip print pattern among Pondicherry population, India, and also to determine its uniqueness. **Materials and Methods:** The study comprised of 60 students (30 males and 30 females), aged from 17 to 25 years, from Pondicherry population, India. A dark-colored lipstick was applied with a single stroke and the students were asked to rub both the lips to spread the applied lipstick, after which a lip print was made on butter paper. The lip print was visualized with magnifying lens. **Statistical Analysis:** Percentage calculation method was used to identify the predominant lip pattern. One-sample *T* test was done to identify the statistical significance within the different types of lip pattern with *P* value <0.05. **Results and Conclusion:** The present study concludes that every individual has unique lip print and Type III appears to be the most predominant pattern in males, followed by the Type II, Type IV, Type I and Type V patterns. In females, Type II appears to be the most predominant pattern followed by the Type IV, Type I, Type III and Type V patterns.

**Key words:** Cheiloscropy, forensic odontology, lip print

## Introduction

Forensic dentistry is one of the most captivating and uncharted branches of forensic sciences, which deals with the identification of the suspects with the uniqueness of oral and maxillofacial structures. Impressions of areas of skin bearing friction ridges, predominantly those from the fingers, have been used for evidential purposes for centuries. Cases in which impressions devoid of friction ridges have been used for evidential purposes have

primarily involved lip prints. Cheiloscropy is one of the most emerging methods of human identification that deals with the identification of unique lip prints. Lip prints are unique and do not change during the life of a person, that is to say that they are invariable and permanent. The wrinkles and grooves on the red part of the labial mucosa were first studied by the famous anthropologist, R. Fischer, in 1902. However, until 1950, anthropology merely mentioned the existence of the furrows without suggesting a practical use for the phenomenon. In 1950, two Japanese scientists, Y. Tsuchihashi and T. Suzuki, reported that the arrangement of furrows on the lip is unique and proposed a classification for the same, which is still in use.<sup>[1,2]</sup> The classification is as follows: Type I: clear-cut grooves running vertically across the lip; Type I': the grooves are straight but disappear halfway instead of covering the entire breadth of the lip; Type II: the grooves fork in their course; Type III: the grooves intersect; Type IV: the grooves are reticular; and Type V: the grooves do not

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fall into any of the Type I to IV and cannot be differentiated morphologically. They have to be obtained within 24 hours of time of death to prevent any erroneous data that would result from post-mortem alterations of lip.

Though lip prints can be instrumental in identifying a person positively, few authors suspect its reliability as an investigation tool as major trauma, pathosis of lip, etc. can affect the pattern and morphology of the grooves. Unanimity does not seem to exist among the investigators for cheiloscropy as the existence of indispensable ante-mortem data cannot be anticipated in all the cases. Owing to the paucity of research on cheiloscropy, an in-depth study and establishment of further facts and legitimacy in lip print will indeed make cheiloscropy a valuable substantiation in forensic dentistry.

The aim of the present study is to determine the uniqueness of lip print and predominant lip print pattern among the subjects visiting Indra Gandhi Institute of Dental Sciences, Pondicherry, India, and to substantiate whether lip print can be used as an investigatory tool in forensic sciences.

## Materials and Methods

The study comprised of 30 males and 30 females aged from 17 to 25 years of age who visited Indra Gandhi Institute of Dental Sciences, Pondicherry, India. Young age group was chosen to overcome age-related lip pathosis. Persons with lip scar, lip lesions, lip deformities and persons with known hypersensitivity to lipsticks were excluded from the study. A dark-colored lipstick was applied with a single stroke and the students were asked to rub both the lips to spread the applied lipstick, after which a lip print was made on butter paper. The lip print was visualized with magnifying lens. The subject's serial numbers were written at the back of the paper. The middle part of the lip print, about 10 mm alone, was considered for the study because the lateral part of the lip print has high chances of destruction. Five well-trained specialists from the Department of Oral Pathology and Department of Forensic Medicine were asked to analyze the lip pattern and the uniqueness. Y. Tsuchihashi classification was used for classifying the lip prints.

### Statistical analysis

Percentage calculation method was used to identify the predominant lip pattern and one-sample 'T' test was done in male and female lip pattern types to identify the statistical significance within the different types of lip pattern with  $P$  value  $<0.05$ .

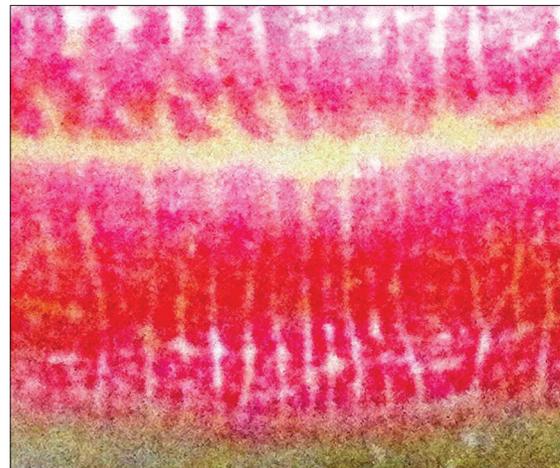
## Results

Y. Tsuchihashi classification of lip pattern was used in the present study. Throughout the whole work, no similar lip print pattern appeared in two subjects. Every individual

has a unique lip print, thereby confirming the uniqueness of the lip print. Type III appears to be the most predominant pattern in males, followed by Type II, Type IV, Type I and Type V patterns. In females, Type II appears to be the most predominant pattern followed by Type IV, Type I, Type III and Type V patterns [Table 1] and [Figures 1-5]. Analysis of different lip print patterns of males and females using one-sample 'T' test revealed that difference in lip print within male and female is statistically significant with  $P$  value  $<0.05$ , hence this can be used in the identification of gender among the suspects [Table 2].

**Table 1: Percentage calculation for different lip patterns among male and female subjects**

Type	Percentage	
	Male	Female
Type I	14	20
Type II	27	38
Type III	28	16
Type IV	25	22
Type V	06	04



**Figure 1: Type I - Vertical grooves**



**Figure 2: Type II - Branched grooves**

**Table 2: One-sample 'T' test for different lip patterns**

Gender	Mean	Standard deviation	'T' value	'P' value
Male	20	9.62	4.65	0.010
Female	20	12.25	3.65	0.022

**Figure 3:** Type III - Intersected grooves**Figure 4:** Type IV - Reticular grooves**Figure 5:** Type V - Undetermined grooves

## Discussion

Cheiloscopy deals with the examination of furrows on the red part of human lip and is an important tool in forensic sciences just similar to fingerprint and DNA analysis. Dental, fingerprint and DNA comparisons are probably the most common techniques used in this context. However, since they cannot always be used, sometimes it is necessary to apply different and reliable investigations like cheiloscopy and palatoscopy.<sup>[3]</sup> Suzuki and Tsuchichashi revealed that lip prints do not change with age.<sup>[4]</sup> El Domiaty *et al.* conducted a chieloscopic study on Saudi individuals, including 13 identical twins and 19 families, and concluded that dissimilar lip print patterns were detected among different individuals of families. Non-identical lip print patterns were recorded in identical twins. Parents and children have similar groove trait, but lip prints are not identical even in identical and non-identical twins.<sup>[5]</sup>

Vahanwalla and Parekh in their study found that Type I was the most frequently observed pattern followed by the Type II pattern.<sup>[6]</sup> Sivapathasundharam *et al.* concluded that Type III was the most predominant pattern from their Indo-Dravidian population study.<sup>[7]</sup> The present study revealed that Type III is the most predominant pattern in males, followed by Type II, Type IV, Type I and Type V patterns. In females, Type II appears to be the most predominant pattern followed by the Type IV, Type I, Type III and Type V patterns. The predominant pattern in the overall population (both males and females) was Type II pattern followed by Type III, Type IV and Type V patterns [Figures 1-5].

With reference to sex, the male and the female lip patterns were different, which was similar to the findings of Shailesh M Gondivkar *et al.*<sup>[8]</sup> One-sample 'T' test showed significant difference in different lip pattern among males and females, which was similar to Sharma *et al.* study.<sup>[9]</sup> Studies of T R Saraswathi *et al.*, Alvarez Segui *et al.* and Ball *et al.* and majority of studies confirmed that the lip print was unique for every individual, and it can be used for the identification of the suspects.<sup>[10-12]</sup> Present study also reveals that the lip print is unique for every individual and no two lip prints are similar to each other, hence it is a reliable tool in the forensic investigations.

## Conclusion

Most of the crime-detecting agencies are unaware of the usefulness of lip prints in the identification of the suspects. Various studies have proved that lip prints are unique and are not similar even in identical twins. The present study revealed that Type III is the most predominant pattern in males, followed by Type II pattern. In females, Type II is the most predominant pattern followed by Type IV pattern, which concludes that the male's lip print is different from that of females; hence this can be used in gender identification.

Also, it is concluded that every individual has a unique lip print and no two lip prints are similar to each other. The crime justice community should begin to seriously consider lip print analysis as yet another important tool in human identification.

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