

# Cheiloscopy – An Adjunct in Identification of Familial Lineage

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## ABSTRACT

**Objective :** To study whether lip prints show genetic inheritance or not

**Materials and methods :** The cross sectional study was conducted on 30 families in different parts of North India (Haryana) with a minimum family size of 3 i.e. father, mother and atleast one child below the age of 25 years and irrespective of their gender. The ethical permission was taken from the institute and the head of locality also. All individuals were healthy and free from genetic diseases. The lip prints of each subject were taken on a bond paper and studied using a magnifying lens by using Suzuki and Tsuchihashi classification.

**Results :** The most common lip print was found to be type I out of all samples. The chi-square test results showed that the relationship between the father's upper lip pattern and child's upper lip pattern in the first quadrant of the upper lip were statistically significant (at significance level of 5%). Further the Cramer's V (0.49) values obtained for the association also indicated a strong relationship between the upper lip patterns of father and child in the first quadrant. Similarly statistical analysis showed strong relationship between lip pattern of mother and child in lower lip i.e. third quadrant. Other quadrants did not show any significant association and relationship between child and parents.

**Conclusion :** The study shows that in fact lip prints do follow a hereditary pattern but they are individualistic, each possessing its own unique characteristics. Thus providing a promising tool for the biometric system and forensics and can replace the older methods for the same in future. Resemblance of lip patterns between parents and children to some extent inspite of being unique and individualistic throws an open area which can be explored for establishing paternity, being simple and inexpensive.

**Keywords :** Inheritance, Lip prints, Familial

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## INTRODUCTION

Lips are proved to have something that characterizes the human being the same as finger prints, which is the lip prints. Lip print pattern is an anatomical character of the human lips. Over the last few decades the importance of lip prints as another skin impression has been exaggerated as such prints could be used in the identification of criminals, diagnosis of congenital diseases or anomalies and much more (1).

Lip print analysis is a process that provides both qualitative and quantitative

results thus its application in the forensic field should be widely accepted by both law enforcement and the legal professionals.

## HISTORICAL OVERVIEW

Fischer in 1902 was the first anthropologist to describe the furrows on the red part of the human lips (2). However, it was only in 1932 that Edmond Locard, one of France's greatest criminologists, recommended the use of lip prints in personal identification and criminalization (3). In 1950, Synder reported in his book Homicide Investigation that the characteristics of the lips formed by lip

grooves are as individually distinctive as the ridge characteristics of finger prints (4). Suzuki, in 1967, made detailed investigations of the measurement of the lips, the use and color of rouge, and the method for its extraction to obtain useful data for practical forensic application (5). Later in 1970, Suzuki and Tsuchihashi, conducted a study on 107 Japanese families and named the grooves on labiorum rutorum as sulci labiorum and the lip prints consisting of these grooves as ‘Figura linearum labiorum rubrorum’ (6). Mc Donnell in 1972 conducted a study on lip prints between two identical twins and reported that two identical twins seemed to be indistinguishable by every other means but their lip prints were different (3).

Cottone, in 1981, reported in his book *Outline of Forensic Dentistry*, that cheiloscopy is one of the special techniques used for personal identification (7). In 1990, Kasprzak conducted a research for period of five years on 1500 persons to elaborate the practical use of cheiloscopy (2). Recently, Vahanwala in 2000 conducted a study of lip patterns to promote the importance of cheiloscopy in forensic science identification (8).

After the vast search of literature, numerous studies indicate lip prints as individual characteristics and no two people possess the same prints. Given this information, it is interesting to wonder whether lip prints are hereditary. The physical attributes regarding the shapes of family members’ lips can clearly be identified as being hereditary; however, the actual prints on those lips are not as easily seen unless printed and analyzed.

Our aim was to study the various pattern types of lip prints in parents and their children and also to detect if any specific pattern can be considered as a genetic marker.

## MATERIALS AND METHOD

### Sample

The Cross sectional study was conducted on 30 families in the localities of North India (Haryana) with a minimum family size of 3 with father, mother and atleast one child below the age of 25 year. The ethical permission was taken from the PGIDS ROHTAK, head of the locality and from each subject too. All individuals were healthy with no genetic diseases. Individuals with active lesions on the lips and with known hypersensitivity to lipstick were excluded from the study. Inflammation of the lip, trauma, malformation, deformity and surgical scars on lips were taken as exclusion criteria.

### Materials used were

- Dark colored lipstick
- Cellophane tape
- White bond paper
- Magnifying lens
- Brush for applying lipstick

After taking the consent, lip prints of the subjects were collected by using the lipstick method in which a thin layer of lipstick was applied on the clean, dry lips uniformly by using the brush. A thin layer of lipstick was applied rather than a thick layer which would fill in the groove patterns. The subjects were asked to rub both the lips to spread the applied lipstick. After this the cellophane tape was applied on to the lips from the glued site very carefully so that no smudge marks were produced. This cellophane tape was carefully removed and then applied on to the bond paper and all the relevant data relating to its identity was written on the paper. Impressions were visualized using magnifying lens. The lip prints of each subject were divided into four compartments, i.e., two compartments on each lip, and were allotted the digits 1-4 in a clock-wise sequence starting from the subject’s upper right. The lip prints were analyzed following the classification of Suzuki and Tsusuchiashi classification. The data was compiled and following results were drawn.

Suzuki and Tsuchihashi’s classifica-

tion method of lip prints (Figure 1), which was as follows:

- **Type I:** Clear-cut vertical grooves that run across the entire lips.
- **Type I’:** Similar to type I, but do not cover the entire lip.
- **Type II:** Branched grooves (branching Y-shaped pattern).
- **Type III:** intersected grooves
- **Type IV:** Reticular grooves.
- **Type V:** Undetermined.

## RESULTS

In our data Type I lip pattern was the most common. Type I and I’ were found to be more common in females and type IV in males. Every subject had his or her own unique lip pattern. No two subjects had exactly similar lip print pattern. Although the present research was not as extensive as done by Suzuki *et al*, it still reflected the same results in that no two people possessed the same lip prints. Although children in our study showed similar lip grooves as their parents (either father or mother) which might indicate a familial inheritance, the placement of grooves was in different location. Therefore, the pattern created was completely different from the parents. Thus lip prints are hereditary, at the same time they are individualistic, each possessing their unique characteristics.

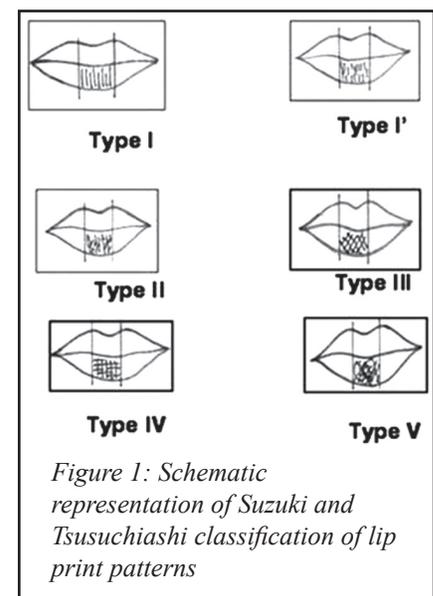


Figure 1: Schematic representation of Suzuki and Tsusuchiashi classification of lip print patterns



Figure 2: Type I lip pattern

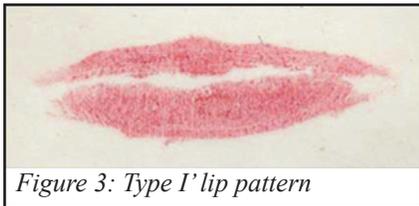


Figure 3: Type I' lip pattern

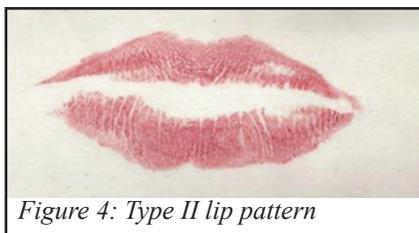


Figure 4: Type II lip pattern

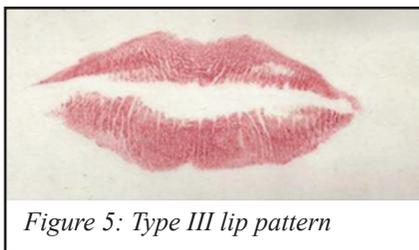


Figure 5: Type III lip pattern

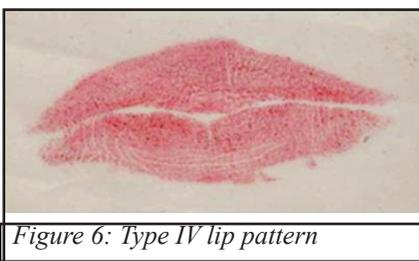


Figure 6: Type IV lip pattern

### STATISTICAL ANALYSIS

Pearson Chi-Square test of association and Cramer's V were used to measure the strength of the association of patterns between parents and their children. The chi-square test results showed that the relationship between the father's upper lip pattern and child's upper lip pattern in the first quadrant of the upper lip were statistically significant (at significance level of 5%). Further the Cramer's V (0.49) values obtained for the associa-

tion also indicated a strong relationship between the upper lip patterns of father and child in the first quadrant. Similar statistical tests were applied analysis showed strong relationship between lip pattern of mother and child in lower lip i.e. third quadrant. Other quadrants did not show any significant association and relationship between child and parents.

### DISCUSSION

Research studies and information regarding the use of lip prints as evidence in personal identification and criminal investigation in forensic dentistry is very much scanty. In spite of few studies available, the study of Tsuchihashi gives a standard classification of his own for different types of lip prints (9). Considering this classification as the basis, the current study was conducted to study the lip prints of parents and their children and to find out whether there is any relation or association between their lip patterns. One common problem that is encountered during the cheiloscopy studies is that of smudging or spoiling of lip prints leading to unidentifiable marks (10). Proper care and attention was paid while recording the lip patterns so as to avoid minimum chances of smudging or spoiling them.

All lip prints showed different patterns. The lip print did not consist simply of one type of groove alone, but appeared as a mixture of varying types (Figure 2-6).

The observation in our study is in concordance with the study of Venkatesh and David (11) that the lip print patterns among the members of the family i.e. of father, mother and child were extremely similar; in detail no two of them were exactly identical. Although children showed similar lip grooves as their parents (either father or mother) which might indicate a familial inheritance; the placement of these grooves was in different locations. Therefore, the pattern created was completely different from their parents. Thus lip

prints are hereditary yet considered to be individualistic, each possessing their own unique characteristics. Our results are in contrast to the findings of Shilpa *et al* (12) in which they did not find any association between the lip print patterns among family members. Hence cheiloscopy has to be carried out in depth on larger sample size using newer scientific technologies.

### CONCLUSION

The conclusion most noted during this research is the fact that lip prints are hereditary yet considered to be individualistic, each possessing their own unique characteristics. For this reason it is safe to suggest lip prints can and should be included in the forensic sciences arena as a legitimate means of identifying persons of interest connected with criminal activity.

Of course lip prints may never be on the same level as fingerprints when it comes to identification; however, it is interesting to know that certain countries around the world are creating databases and programs centered around the characteristics and appearances of lips specifically for the purpose of solving crimes. The need of time is that more such databases should be created to use lip prints as tool for reading genetic inheritance of traits within the families.

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