Cheiloscopy: A Tool For Sex Identification

Review Article

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Abstract

The purpose of this study is to estimate sex from lip print pattern. Sex estimation is important to identify whether the crime has been committed by a male or female or to identify the perpetrator. Cheiloscopy is the study of lip print pattern, which is very useful in forensic identification of a person. Lip prints are actually lines and fissures in the form of wrinkles in the zone of transition of lip i.e. red part of lips. These ridges, grooves or wrinkles are studied for the purpose of positive identification of a person. Lip prints can also prove to be as one of the best method of personal identification. Lip print is unique to individual and thus can be used for identification purpose. Lip prints are important evidence in case like sexual assault, murder, rape and also remain at scene of crime unknowingly on cups, glasses, cigarette butts, clothing's, skin etc.

Keywords: Forensic Science; Cheiloscopy; Lip Prints; Ridges; Grooves; Forensic Identification.

Introduction

Human identification is an universal and important process. This is based on various scientific methods considering fingerprint analysis, DNA analysis. As we know that fingerprints are unique for every person and they help in their personal identification. Similarly lip print is unique to individual and thus also used for the identification purposes. Cheiloscopy deals with the furrow and groves (elevation & depressions) present on lips. These groves are called sulci labarum. These groves are unique to person to person and can be used to reveal the identity of a person just as fingerprints and DNA profiling [1, 2]. Hence lip prints can be used to verify the presence or absence of a person at scene of crime [3, 4].

Study of lip prints or Cheiloscopy is very important method used in forensic discipline. In the last few years we have seen a great development in the use of lip prints, which may be useful in identification and for the diagnosis of congenital diseases and anomalies etc [5]. Cheiloscopy techniques have an equal value in relation to other types of forensic evidence for personal identification and sex determination [6, 7]. Lip prints help in linking a crime, suspect and scene of crime. This is the trace evidence which helps in excluding a person from the list of suspects. Lip prints are an important evidence in case like sexual assault, murder, rape and also remain at scene of crime unknowingly on cups, glasses, cigarette butts, clothing's, skin etc [8].

During few years various studies were carried out by several researchers in India and in other countries. Different aspects of lip prints were studied like stability, uniqueness, characters on the bases of which sex of a person can be determined on the basis of lip prints and various other morphological characters among different groups of population.

Classification of lip prints is based on the patterns of wrinkles or grooves on the vermillion border of the lips.

Dr. Santosh in 1966 divided the nature of wrinkles and grooves into simple and compound types [9].

Simple

When they are formed only by one element

• Straight line

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- Curved lines
- An angled line

Compound

When they are formed by several elements.

- Bifurcated
- Trifurcated
- Anomalous groups

Classification based on their thickness [9].

- Thin lip prints: These are seen among European people.
- Medium lip prints: These are 8-10 mm in thickness, in which the pink zone is found to be more rounded found in general population.
- Thick lip prints: These are very big in which the labial string appears inverted and mainly found in Negros.
- Mixed lip prints: This type of lip was may commonly seen in oriental people.

Lip prints were classified into 6 types according to the shape and course of the grooves as shown in below [10] (Table 1 and Figure 1).

French scientist Renaud studied about 4000 lip print patterns and classified lip prints into A-J categories [11] (Table 2 and Figure 2).

Classification of pattern of lines on the red part of the lips given by Kasprzak is as follow [12, 13] (Figure A-D).
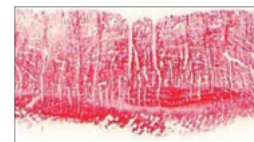
- If the lines prevail, the pattern is described as linear "L"

Figure. A

- If the bifurcation is dominant, it is called bifurcation "R"

Figure. B

- If the lines cross the pattern is dubbed reticular "S"

Figure. C

- In case where there is no superiority can be estimated the pattern is named undetermined "N"

Figure. D
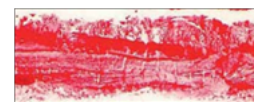
Table 1. Suzuki and Tsuchihashi lip prints classification.

Classification	Groove type
Type I	Complete vertical
Type I'	Incomplete vertical
Type II	Branched
Type III	Intersected
Type IV	Reticular pattern
Type V	Irregular

Figure 1.

Type I   **Type I'**

Type II

Type III   **Type IV**   **Type V**

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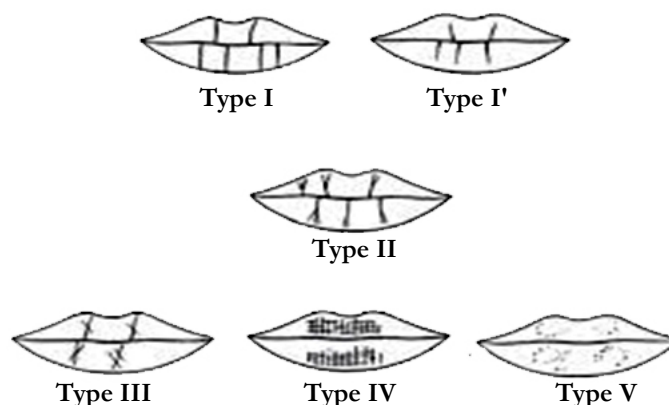
Table 2. Renaud lip prints classification.

Classification	Groove type
A	Complete vertical
B	Incomplete vertical
C	Complete bifurcated
D	Incomplete bifurcated
E	Compete branched
F	Incomplete branched
G	Reticular pattern
H	X or coma form
I	Horizontal
J	Others forms (ellipse, triangle)

Figure 2.
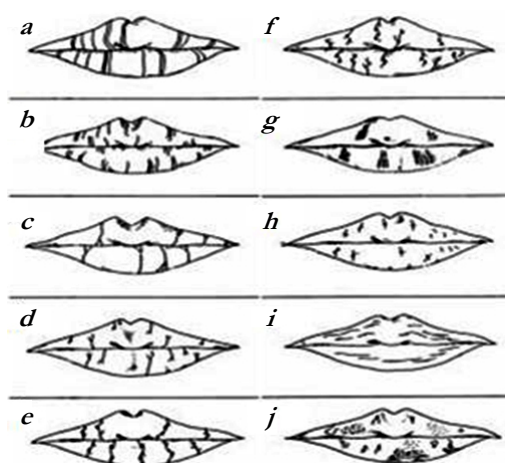
Classification, given by Afchar-Bayar M in 1979, based on a six-type groove organization [14] (Table-3).

Materials and Methodology

The present study was conducted on 72 individuals (36 males and 36 females) in the age group from 1-40 and above who were randomly selected. First group: 1-10 year's individuals. Second group: 11-20 year's individual. Third group: 21-30 year's individuals. Forth group: 31-above year's individuals. In each group 9 males and 9 females were included. The materials used were dark colored lipstick, bond paper, cellophane tape, a brush for applying lipstick uniformly, and a magnifying lens. Lipstick was applied on the vermillion border of the lips. Lipstick was evenly distributed on the lips. The subject was asked to rub the lips against each other to spread lipstick. After it a sufficient portion of cellophane tape was taken and pressed against lips, and thus impressions were transferred to tape which was then slicked on the white paper for permanent records (Figure 3).

Result

Lip prints were obtained from which were randomly selected from different places in Rohtak District of Haryana State, India. The samples were analyzed by simple percentage method. For group 1st are, total 18 individuals were included 9 males and 9 females. In total most common type of lip print pattern is III i.e. 35 %, then comes type I i.e. 25 %, then each I', II and V are 10 % type IV is absent (Table 4).

Type III was the most common type of lip print pattern in this group.

In group 2 total 18 individuals were included 9 males and 9 females (Table 5).

Type II was the most common type of pattern in this group.

In group 3 total 18 individuals were included 9 males and 9 females. Type V patterns are absent in both male and female this group (Table 6).

Type III was the most common type of pattern found in this group.

In group 4 again total 18 individuals were included 9 males and 9 females type I' not found in both male & female, type II also not found in both male & female (Table 7).

Type III was the most common type of pattern found in this group.

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Table 3. Afchar-Bayar M classification system.

Classification	Groove type
A1	Vertical and straight grooves, covering the whole lip
A2	Like the former, but not covering the whole lip
B1	Straight branched grooves
B2	Angulated branched grooves
C	Converging grooves
D	Reticular pattern grooves
E	Other grooves

Figure 3. (Type I lip print).

Sample taken during study
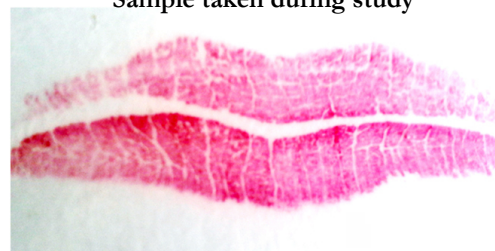
Table 4. Percentage of group 1 (age 1-10).

Type	Female	% age	Male	% age	Total	% age
I	4	40%	1	10%	5	25%
I'	1	10%	1	10%	2	10%
II	1	10%	1	10%	2	10%
III	1	10%	6	60%	7	35%
IV	--	--	--		--	--
V	2	20%	--		2	10%
Total	9		9		18	

Table 5. Percentage of group 2 (Age 11-20).

Type	Female	% age	Male	% age	Total	% age
I	1	10%	2	20%	3	15%
I'	-	--	1	10%	1	5%
II	3	30%	3	30%	6	30%
III	1	10%	2	20%	3	15%
IV	2	20%	1	10%	3	15%
V	2	20%	-		2	10%
Total	9		9		18	

Table 6. Percentage of group 3 (age 21-30).

Type	Female	% age	Male	% age	Total	% age
I	4	40%	1	10%	5	25%
I'	1	10%	2	20%	3	15%
II	1	10%	--	--	1	5%
III	2	20%	6	60%	8	40%
IV	1	10%	--	--	1	5%
V	--		--	--	--	--
Total	9		9		18	

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Table 7. Percentage of group 4 (Age 30 & above).

Type	Female	% age	Male	% age	Total	% age
I	3	30%	2	20%	5	25%
I'	-	--	--	--	--	--
II	-	--	--	--	--	--
III	3	30%	3	30%	6	30%
IV	2	20%	3	30%	5	25%
V	1	10%	1	10%	2	10%
Total	9		9		18	

Table 8. Shows the total percentage of different type lip patterns.

Type	Female	% age	Male	% age	Total	% age
I	12	33.3%	6	16.7%	18	25%
I'	2	5.6%	4	11.1%	6	8.35%
II	5	13.9%	4	11.1%	9	12.5%
III	7	19.4%	17	47.2%	24	33.3%
IV	5	13.9%	4	11.1%	9	12.5%
V	5	13.9%	1	2.8%	6	8.35%
Total	36	100%	36	100%	72	100%

Discussion

In present study as per the classification method of Suzuki and Tsuchihashi Type I pattern is mainly found in females while in males Type III is found. Sex of a person can be successfully determined with the help of lip print patterns.

According to previous studies it was found that Type I and Type I' is most frequently found in females while in males Type III, Type IV and Type V were dominating. Besides this no other lip print pattern matches with each other and are unique to every individual [15-18]. According to another study, Type I and Type I' patterns were found to be dominant in females, while Type III and Type IV patterns dominant in males. Lip prints are dissimilar among different individuals [19].

In other previous studies it was concluded that Type III was the most predominant pattern in Indo-Dravidian population. 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 [20, 21].

In another study from India male and female subjects in Maharashtra were studied and sex determination was correctly done in 65 males and 67 females with high degree of accuracy [22]. Other studies showed the pattern types found in the different populations like in Punjabi population the vertical pattern (Type I) was the most common lip print pattern in both the sexes [23]. It was found that intersecting pattern was most common, both among males and females having 39.5 and 36.5%, respectively. However, the least common was the reticular pattern seen in 11.0% males and 13.0% females [24]. The most frequent is type IV, which is the reticular type of lip print [25]. Another study showed that no lip prints matched with each other. Also, lip-prints did not change on repeated sampling [26].

Conclusion

In all the previous studies conducted on lip prints the lip print pattern in a population was studied. In present study lip prints are used as a sex determination tool and according to age group lip prints are studied. The lip prints are compared for sexual identification. This study has proved that (Cheiloscopy) lip prints hold the potential to identify the sex (whether male or female) and identity of the individual, as they remain unchanged over the time and unique to individual. There is a positive result for the application of lip prints in forensic investigation and criminal cases. Hence it is concluded that lip prints can be used as sex estimation tool.

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