

The Scrutiny of Uniqueness and Pattern Examination of Lip Prints Amidst Himachali Population

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2. Keywords

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1. Abstract

The physiological and behavioural characteristics of human being are used for personal identification, where about one of the most crucial physiological characteristic is lip print. Lip prints are unique patterns presents at the dermal surface of lips. The lips are lined with the vermilion border and further is characterised as lower and upper lip. Lip prints are thereby individual to each person as they are developed at the 6th week of intrauterine life. The study of lip prints is called as Cheiloscropy. The existence of lip prints on scene of occurrence adduces investigation and can be examined for person's identification. In the present study, the 108 samples of lip prints were collected from 50 males and 58 females of Himachal based population. The present study focuses on the carefully study, examination and comparison of the lip prints, classifying them based upon their pattern and also to prove the uniqueness of lip prints among Himachali population.

3. Introduction

Personal identification is a major concern in investigation procedures. The physiological characteristics of a human including the lip prints, DNA fingerprint, fingerprints, ear patterns, vein pattern etc. and the behavioral characteristics including handwriting, voice, keystroke pattern etc. are useful for personal identification. The lips prints are the patterns of wrinkles and grooves present between the upper and lower vermilion border of lips. Lip prints start to develop in the human body at around 6th week of intrauterine life and remain permanent throughout the life except for the cases in which lips are affected due to some disease or medical condition. The lip prints are formed by the wrinkles and grooves that are present on the dermal skin surface of lips. Lip prints can be easily found on a crime scene or as evidence in criminal cases. They can be in a latent state which requires additional steps to recover them or can be visible due to pigmented substances present on the lips at the time of transfer of lip prints.

4. Historical Overview

In 1902, Fischer was the first anthropologist to describe the furrows on the red part of human lips[1]. The use of lip prints was first recommended by Sir Edmond Locard in 1932 [1]; though the first-ever study on lip prints was carried out in 1932, in Hun-

gary. A burglary case happened to be in Poland discovered the pattern of lip prints that was said to be found on the window glass. In 1966 Two Japanese scientists, Y. Tsuchihashi and T. Suzuki in the period 1968-71, established that the arrangement of lines on the red part of the human lip is individual and unique for each human being [3]. They named the grooves as Sulci Labiorum and lip prints consisting of these grooves as "Figura Linearum Labiorum Rubrorum". Cottone in 1981 reported that cheiloscropy is one of the special techniques used for the purpose of identification[2].

Cheiloscropy techniques in 1985-87, were used in 85 cases including 65 cases of burglary, 15 cases of homicide and five cases of assault. In 34 cases, the identification was positive which means that the cheiloscopic techniques were equal in value with other types of forensic sciences [3]. In 1967 Santos was the first person to classify lip grooves. He divided them into four types, namely, Straight line; Curved line; Angled line and Sine-shaped curve [4, 5].

Himachal Pradesh is a northern state of India, bordered by Jammu & Kashmir, Punjab and Haryana, Utrakhland, and Tibet. The state is divided into 12 districts and has a total population of 6,864,602 including 3,481,873 males and 3,382,729 females

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according to the Census of India 2011[6]. The presented study focuses on the carefully study, examination and comparison of the lip prints and to classify them based upon their pattern and also to prove the uniqueness of lip prints among Himachali population[7, 8].

5. Material and Methodology

5.1. Sampling

The study sample comprises 108 lip prints samples of Himachali population, aged between 18 to 30 years old. Special care was taken while selecting the individuals so that people with hypersensitivity, lesions, abnormality and inflammation on lips are not considered for the study.

5.2. Study Material

A dark pigmented lip colour, lip brush, cello tape, white paper, magnifying glass, scale and camera.

5.3. Method and Technique

The dark colored lip color was applied on clean lips using a lip brush. The lip color was first applied to the vermilion border and then on the lower lip followed by the upper lip. The individual was asked to press the lips together so that the lip color is applied evenly on the lips. Then a cello tape was placed on the lips and pressed, and then the tape is lifted and pasted on the white colored sheet. Each sample was collected in the same manner. The lip prints were then photographed using a scale. For analysis middle area of lower lip upto 10mm is analyzed in male and female lip prints (Figure 1 & 2).



Figure 1: Steps followed for the collection of lip print samples as:

1. To clean lips with suitable dust remover.
2. Application of lip colour.
3. Use cello tape to lift the lip prints.
4. Paste cello tape on white coloured sheet.

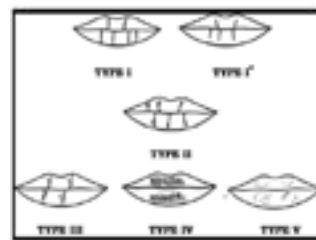


Figure 2: Types of lip print patterns [3]



Figure 3: Type I lip print pattern



Figure 4: Type I* lip print pattern



Figure 5: Type II lip print pattern



Figure 6: Type III lip print pattern



Figure 7: Type IV lip print pattern



Figure 8: Type V lip print pattern

6. Analysis of Lip Prints

The analysis of lip print patterns was based upon the classification of Suzuki and Tsuchihashi, which are as follows:

1. Type I - A clear-cut groove running vertically across the lip.
2. Type I' - Partial-length groove of Type I.
3. Type II - A branched groove.
4. Type III - An intersected groove.
5. Type IV - A reticular pattern.
6. Type V - Other patterns.

7. Statistical Analysis

The data was statistically analyzed by Chi-square test using IBM SPSS® software for determining the frequencies of the pattern types in each lip quadrant of male and female lip prints.

8. Result and Discussion

The participants belong to Himachal Pradesh. Total of 108 individuals participated to provide their lip print samples in which 50 were males and 58 were females. The patterns were analyzed based on Y. Tsuchihashi and T. Suzuki classification of lip print pattern to identify the uniqueness of lip prints among Himachali population (**Table 1**).

Table 1: Results for statistical analysis of males and female lip print pattern.

S. No.	Type	Male % (χ^2)	Female % (χ^2)	Total	P
1	Type I	11 (22%)	12 (20.68%)	23	≤ 0.003
		<i>10.65</i> (0.01)	<i>12.35</i> (0.01)		
2	Type I'	6 (12%)	16 (27.58%)	22	≤ 0.003
		<i>10.19</i> (1.72)	<i>11.81</i> (1.48)		
3	Type II	14 (28%)	11 (18.96%)	25	≤ 0.004
		<i>11.57</i> (0.51)	<i>13.43</i> (0.44)		
4	Type III	7(14%)	6 (10.34%)	13	≤ 0.002
		<i>6.02</i> (0.16)	<i>6.98</i> (0.14)		
5	Type IV	7 (14%)	6 (10.34%)	13	≤ 0.003
		<i>6.02</i> (0.16)	<i>6.98</i> (0.14)		
6	Type V	5 (10%)	7 (12.06%)	12	≤ 0.001
		<i>5.56</i> (0.06)	<i>6.44</i> (0.05)		
Total		50	58	108	

*Expected values are displayed in italics *individual χ^2 values are displayed in parentheses *P = probability.

In males predominant pattern was Type II (28%) followed by Type I (22%), Type I' (12%), Type III (14%), Type IV (14%), Type V (10%). In Females predominant pattern was Type I' (20.68%), followed by Type I (20.68%), Type II (18.96%), Type V (12.06%), Type III (10.34%) and Type IV (10.34%). The difference in pattern among male and females samples was found to be statically significant having probability ($P \leq 0.004$).

9. Conclusion

Cheiloscopy, the study of lip prints for personal identification especially in criminal cases such as murder, homicide, sexual assault and burglary could be an important part of forensic examination. The conducted study was able to prove the uniqueness of lip prints among Himachali population and statistical data provided the types of lip print pattern among them. No two lip prints were found to be the same and all were unique. The Type II lip print pattern was predominant in males and Type I' were predominant in females. Type V was least found in males while Type IV was least found in females. The difference in pattern among male and females samples was found to be statically significant having probability ($P \leq 0.004$). Cheiloscopy is one of the emerging fields for forensic examination and needs more research work to be done so that it could be used in real field cases.

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