The Personal Identification by Means of Cheiloscopy among People of North India

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Abstract

Introduction: Personal identification is becoming increasingly important not only in legal medicine but also in criminal investigation, identification and in Genetic Research. The grooves present on the lips are unique for every person. Cheiloscopy is a forensic investigation technique that deals with the identification based on lip traces.The aim of this study was to assess the specific lip print pattern for personal identification, its uniqueness among males and females and the reliability of the technique in suspect identification at the crime site.

Materials and Methods: The study sample comprised 200 individuals (100 males and 100 females) aged between 10 and 50 years; dark-colored lipstick was applied uniformly on the lips and clear impressions of the lips were taken on the bond paper. The scanned lip-print image studied using Microsoft office picture manager. Fingerprints were analyzed by following the classification given by Suzuki and Tsuchihashi. Chi-square test and p-value of the samples were calculated.

Results: The study revealed that the lip print patterns for each individual were unique and there was no peculiar pattern distribution among male and female subjects.

Conclusion: Cheiloscopy is analogous to fingerprint analysis and can be used as a tool for individual identification along with dermatoglyphics. It can also be used as an aid in forensic sex determination.

Keywords: *Cheiloscopy, Lip print, sex determination, Lip pattern*

Introduction

Personal identity of human is most challenging and is a fundamental process in Legal Medicine, both in civil and criminal terms.[1]Article 6 of Universal Declaration of Human Rights states that everyone has a right to recognition everywhere as a person before the law.[2] There are many well-known methods of human identification, commonly as fingerprints, palm-prints and foot-prints by recognizing the pattern of furrows and ridges. Similarly Lip-print is also a known method (Cheiloscopy) for identification of an individual. Lip prints are identifiable as early as the 6th week of intrauterine life, and from then on, their pattern rarely changes, resisting many afflictions such as herpetic lesions.[3]The creases on the vermillion border of the lips, which appear as white area in the lip prints, and the raised reddish areas outlined by these creases appear as dark areas are analogous to furrows and ridges present on finger, foot and palm.[4] Japanese scientists, Tsuchihashi and Suzuki have carried out the most extensive research in this field and established that lip print patterns are unique for each human being. They also proposed a classification of lip prints, that is the most widely used classification in literature to date.[5] Awareness of the modern techniques of crime detection has alerted the criminals for taking sufficient precautions like the use of gloves. In such circumstances, the identification of criminals using accurate methods like fingerprint analysis fails to establish a positive identity.

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The investigators can rely on cheiloscopy as supportive evidence in specific investigations[6]and study on variations in the patterns of grooves among males and females could also help in sex determination.[7]

The objective of this study was to assess the specific lip print pattern for personal identification, their uniqueness among males and females and the reliability of technique in suspect identification at the crime site.

Material and Method

The present prospective study was conducted in the Department of Forensic Medicine, CMC, Ludhiana. The study sample comprised of 200 individuals (100 males and 100 females) from general population in the age group of 10-50 years over a period of 6 months following inclusion and exclusion criteria. The subjects willing to participate in the study and having healthy upper and lower lips along with well defined vermilion border, vermilion zone and labial tubercle were included in the study. Subjects with pathology like deformity, inflammation, trauma, malformation and surgical scars of lips and allergy to lipstick or having generalized skin allergy were excluded.

The study protocol was approved by an institutional ethical committee before commencing the study. All the subjects were grouped separately in four sets of 10 males and 10 females each, according to the age groups like A-10 to 20 years, B- 21 to 30 years, C- 31 to 40 years, D- 41 to 50 years. Each subject identity was hidden from the analyzer. Informed written consent was taken before obtaining the lip prints.

Procedure of collection of sample

The subject was asked to clean his/her lip thoroughly with water and dry it with tissue paper. A non glossy dark colored lipstick (Lakme, Hindustan Lever Ltd., India) was applied on the lips starting from the mid line and moving up to the vermillion border. The lipstick was allowed to dry for about 2 minutes. To ensure the lipstick spreads evenly over lips, the subject was asked to rub the upper and lower lips together prior to taking the print. The bond paper bearing serial number and date was provided to subject. The subject was asked to press his/her lips onto the paper by holding it between the lips, so as to leave a clear impression of lips on the bond paper. The lip-print was scanned and image obtained was magnified and was studied using Microsoft office picture manager. Samples analysis were calculated by Suzuki and Tsuchihashi classification[8]as,

Type I - A clear-cut groove running vertically across the lip,

Type I' - Partial-length groove of Type I,

Type II - A branched groove,

Type III - An intersected groove,

Type IV - A reticular pattern and

Type V - Other patterns.

The data was statistically analysis. Chi-square test was applied to see the significant differences in lip print patterns and demographic parameters and p-value less than 0.05 was considered significant.

Results

Lip prints of each individual showed unique pattern. All four quadrants of upper and lower lips in each individual did not have only one pattern but appeared to have a mixture of different patterns. The most common pattern of upper lips in males were that of the Type I' (30.75%) followed by Type II(27.25%), Type I(21.5%), Type IV (8.25%), Type V (6.5%) and Type III (5.75%). Where as in females the most predominant pattern of upper lips was that of Type II (35.25%) followed by Type I (33.5%), Type I' (15%), Type IV (8.5%), Type III (4.5%) and Type V (3.25%)(Table 1).

The most predominant pattern of lower lips in males were that of the Type I (42.75%) followed by Type II (32.75%), Type I' (13%), Type IV and Type V (4 %) each and Type III (3.5%).Where as in females the most predominant pattern of lower lips were that of Type I (40.25%) followed by

Type II (31.25%), Type I (10.25%), Type IV (9.75%), Type III and Type V (4.25%) each (Table 2). The percentage of lower lip print patterns (Type I and Type II) in both sexes was almost similar in different quadrant (Table 2) . The p- value between both sexes was insignificant among lower lip pattern.

Among males and females, the upper lip showed a predominance of Type II (31.25%) of all the patterns followed by Type I (27.5%), Type I'(22.88%), Type IV (8.37%), Type III (5.13%) and Type V (4.87%). The lower lip showed a predominance of Type I (41.5%) among all patterns. This was followed by Type II (32%), Type I' (11.62%), Type IV (6.88%), Type V (4.12%) and Type III (3.88%).(table 3)(p-value significant(0.00))

Comparison of Pattern of lateral and middle segments of upper lip and lower lips in males and females separately is shown in Table-4 and Table- 5. p-value significant in the lateral segment of both lip patterns of males(0.00)(Table 4) and p-value significant among middle segment of lower lip pattern in males and females, 0.00 and 0.01 respectively.(Table 5)While comparing the lip patterns of males and females(Table 6) the Chi-square test (30.569) and p-value (0.00) is significant.

Table- 1: Lip print patterns in different segments of the upper lip of study group population

Types	Gender	ULL	ULM	URM	URL	TOTAL	%age	Chi-Square test	p-value
I	Males Females	27 33	17 28	26 33	16 40	86 134	21.5 33.5	4.129	0.247
I'	Males Females	21 10	36 19	31 15	35 16	123 60	30.75 15	22.564	0.000
II	Males Females	30 44	29 29	24 37	26 31	109 141	27.25 35.25	1.791	0.618
III	Males Females	5 4	3 5	8 6	7 3	23 18	5.75 4.5	1.961	0.590
IV	Males Females	7 4	10 15	7 7	9 8	33 34	8.25 8.5	-	0.601
V	Males Females	10 5	5 4	4 2	7 2	26 13	6.5 3.25	1	0.801
Total	Males females	100 100	100 100	100 100	100 100	400 400	100 100	-	-

ULL- upper left lateral, ULM- Upper left middle, URM – Upper right middle, URL – Upper right lateral

Table 2: Lip print patterns in different segments of the lower lip of 100 males and 100 females

Types	Gender	LLL	LLM	LRM	LRL	TOTAL	%age
I	Males Females	44 36	50 49	46 44	31 32	171 161	42.75 40.25
I’	Males Females	13 14	9 13	14 5	16 9	52 41	13 10.25
II	Males Females	33 28	28 24	32 29	38 44	131 125	32.75 31.25
III	Males Females	5 5	4 1	1 7	4 4	14 17	3.5 4.25
IV	Males Females	3 10	5 9	4 12	4 8	16 39	4 9.75
V	Males Females	2 7	4 4	3 3	7 3	16 17	4 4.25
Total	Males females	100 100	100 100	100 100	100 100	400 400	100 100

LLL- Lower left lateral, LLM- Lower left middle, LRM –Lower right middle, LRL – Lower right lateral

Table- 3: Showing lip patterns on both lips of the study group and its percentage

Types	**Type I**	**Type I’**	**Type II**	**Type III**	**Type IV**	**Type V**	**Total**
Upper lip%	220(27.5)	183(22.88)	250(31.25)	41(5.13)	67(8.37)	39(4.87)	800
Lower lip %	332(41.5)	93(11.62)	256(32)	31(3.88)	55(6.88)	33(4.12)	800
Total	552(34.5)	276(17.25)	506(31.63)	72(4.5)	122(7.62)	72(4.5)	1600

Table 4: Comparison of Lateral Lip print patterns of both lips in males and females separately

Types	Type I	Type I'	Type II	Type III	Type IV	Type V	Total
Upper lip % (ULL) Male	43(21.5)	56(28)	56(28)	12(6)	16(6)	17(6.5)	200
Lower lip % (LLL) Male	75(37.5%)	29(14.5%)	71(35.5)	9(4.5)	7(3.5)	9(4.5)	200
Upper lip % (ULL) Female	73(36.5)	26(13)	75(37.5)	7(3.5)	12(6)	7(3.5)	200
Lower lip % (LLL) Female	68(34)	23(16.5)	72(36)	9(4.5)	18(9)	10(5)	200

ULL (Upper Lateral Lip), LLL (Lower Lateral Lip)

Table 5: Comparison of Lip print patterns of Middle segment both lips in males and females separately

Types	Type I	Type I'	Type II	Type III	Type IV	Type V	Total
Upper lip% (UML) Male	43(21.5)	67(33.5)	53(26.5)	11(5.5)	17(8.5)	9(4.5)	200
Lower lip % (LML) Male	96(48)	23(11.5)	60(30)	5(2.5)	9(4.5)	7(3.5)	200
Upper lip %(UML) Female	61(30.5)	34(17)	66(33)	11(5.5)	22(11)	6(3)	200
Lower lip% (LML) Female	93(46.5)	18(9)	53(26.5)	8(4)	21(10.5)	7(3.5)	200

UML (Upper Middle Lip), LML (Lower Middle Lip)

Table - 6: Comparison of lip patterns of males and Females

Type	I	I'	II	III	IV	V	Total
Male (%)	257(32.13)	175(21.87)	240(30)	37(4.62)	49(6.13)	42(5.25)	800
Female (%)	295(36.87)	101(12.63)	266(33.25)	35(4.37)	73(9.13)	30(3.75)	800

Discussion

When there is lacking evidence like finger prints the valuable lip grooves can be used successfully.[3] The edges of the lips have sebaceous glands with sweat glands in between therefore, secretions of oil and moisture enable development of 'latent' or persistent lip prints, analogous to finger prints.[9] Few studies on lip morphology and patterns have shown that chelioscopy has a potential to become an additional weapon for personal identification.[10]

In the present study lip prints were recorded by closed lips method. In closed mouth position, the lip exhibits well-defined grooves, where as in the open position the grooves are relatively ill defined and difficult to interpret.[11]

In the present study, no two lip print patterns matched each other, thus establishing the uniqueness of lip prints, which is in agreement with the report of Tsuchihashi *et al*.[8]The most predominant lip pattern in our study group was Type I (34.75%) followed by Type II (31.63%), Type I' (17.25%), Type IV (7.62%) and Type III and Type V (4.5%) each(Table 3) which is in accordance with study conducted by Multani et al.[12]. They also reported the most common lip pattern as Type I(27.5%) in the entire population of their study and the least common was Type V (7%). While Verghese *et al*., in their study on Kerala population, found that Type IV pattern was predominant.[13]

In our study we observed almost same lip print patterns in both sexes except in male Type V was 5.25% where as in females it was 3.75 %.(Table 6). We observed Type I lip pattern most commonly prevalent in them, where as other workers reported Type II as the predominant pattern in both sexes (males (42.2%), females (43.63%) respectively.[14]

In the present study most common lip print pattern in males was Type I (32.13%) but some studies reported Type IV [15]and Type III[16]as the predominant pattern in males.

We observed Type I most predominant lip print pattern in females (36.87%) which was in-

accordance with many studies,[15]in contrary, some studies revealed Type II as the most common pattern.[16,17]

In males Type I' and Type II lip pattern was common in lateral quadrant of upper lip and Type I was common in lower lip lateral quadrant. Where as in females Type II was predominant in both upper and lower lateral quadrants of lips.(Table 4) Many studies were documented for sex determination by other workers and they documented certain pattern trends prevalent in either sex. According to them Type I and I' are dominant in Females in third and fourth quadrants of lower lip and Type II is common in Males in the second quadrant of upper lip, left side. Individuals with all quadrants having different pattern were common in males whereas having same pattern in all quadrants were seen in females.[18]

Cheiloscopy is a simple, easy to access, non-invasive technique and does not require a very complex instrument so it can be used as a tool for identification of an individual along with finger print analysis. Its utilization at a scene of crime depends on a high degree of the skill of members of law enforcement agencies.

Limitations of the Study Subjects with lip pathologies and deformities could not be established as they were not assessed. Forensic identification of such individual remains questionable.

Conclusion

Cheiloscopy is analogous to fingerprint analysis. Lip prints can add additional evidence to a crime scene, and this is valuable, especially in cases of lacking other evidence, like fingerprints.[19] It can also be used as an aid in forensic sex determination and for personal identification.

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