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Lip Print Patterns of Palakkad, Kerala

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Abstract

Personal identification is important not only in legal medicine but also in criminal investigation, identification and genetic research. Several methods are available for personal identification out of which, the best and commonly used one is fingerprints. Another emerging identification tool is Cheiloscopy or Lip Pattern study. Cheiloscopy involves the study of the grooves and furrows present on the red part of the human lips. These grooves occur as distinct patterns or types and are unique to each individual and thus can be used to fix the identity of a person. The grooves present on human lips are unique to each person and can be used to determine identity. A study carried out to study the lip print patterns in Palakkad, Kerala revealed that Type -I pattern was the most prominent pattern among the females and Type-II and Type-III pattern was more common among the males. The least encountered lip print pattern was Type-V. Detailed study in the four lip quadrants revealed the potential of using Cheiloscopy as an identification tool. The presence of just 1.08 % Type V pattern in upper left quadrant and its absence in males is worth further study. The absence of Type-V pattern in the left lower quadrants of both sexes also needs to be further investigated. The various patterns and distribution is discussed. A detailed study with more samples and inclusion of transgender may bring out a clearer picture. This may soon find a place as an economical identification tool or biomarker.

Key Words: Cheiloscopy, Lip print patterns, Personal Identification tools, Lip quadrants

Introduction

Personal identification is important not only in legal medicine but also in criminal investigation, identification and genetic research[1]. Several methods are available for personal identification out of which, the best and commonly used one is fingerprints. Another emerging identification tool is Cheiloscopy or Lip Pattern study. Any tool useful for biometric study is always appreciable and should be tested. “Cheiloscopy” derived from Greek words chelios-lips and skopein-see is the name given to the study of lip prints. Cheiloscopy involves the study of the grooves and furrows present on the red part of the human lips. The grooves present on human lips (Sulci labiorum) are unique to each person and can be used to determine identity[2].

Lip prints are as unique as fingerprints and do not change during the life of a person[3]. Cheiloscopy is a potentially useful tool for personal identification.The lip prints of parents and children and those of siblings have been reported to show some similarities[4]. Research studies and information regarding the use of lip prints as evidence in personal identification and criminal investigation in dentistry, although age old, are scanty[5]. Variations in patterns among males and females could help in sex determination. The arrangement of lines on the red part of the human lip is individual and unique for each human being [6].

The legal system typically requires two different types of corroborative evidence in order to confirm placement of a suspect at a crime scene. Collection of lip prints along with other crime scene evidence is always useful and may help to confirm matters. In a crime scene investigation, lip prints can link a subject to a specific location if found on clothes or other subjects, such as glasses, cups or even cigarette butts[10] . Traces of lipstick smears found on these objects or parts

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of body may all be significant forensic evidence[8]. Lip prints may be found in cases of sexual assault or even homicides[9]. The lipstick itself can be analysed for various oils and waxes and an identification of the lipstick type can also be obtained[10] .

The use of lip prints in forensic identification is preferred because of their low utilization cost, simplicity, reliability and because it is not time consuming. It could be easily employed by a general dentist, as it does not require expertise.

Martin 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.

Another accepted classification method of lip prints is as follows[6]

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

Type V - Other patterns

Cheiloscopy hasn't been attempted among individuals of Palakkad, Kerala. Hence this study was planned to document common lip patterns among individuals of this region of Kerala.

Materials and Methods

Subjects and Study Area

A cross sectional survey was conducted among college students from different parts of Palakkad to identify the target population. This study was conducted among 132 subjects, which comprised of 92 females and 40 males aged between 18 and 24. They were briefed about the objectives of the study and written consent was taken from them before undertaking the study. Subjects undergoing orthodontic treatment, having congenital abnormalities, inflammation or trauma and known hypersensitivity to lipstick and students who were not from Palakkad were excluded from the study.

Students (92 females and 40 males) coming from different taluks of Palakkad district were randomly selected for the study. A majority of students from our college who were from different panchayaths of Alathur gave written consent for this study. Male students were not willing to apply lipstick; hence we had to be satisfied with just 40 of them who obliged to be a part of this study. Alathur is a village and grama panchayat in the Palakkad District, state of Kerala, India. It is the headquarters of the Alathur Taluk and is situated at the south west end of the district 24 km from the district headquarters at Palakkad. Alathur Taluk is predominantly rural and has an agricultural economy.

Alathur is located along the Coimbatore-Cochin national highway NH 47. It consists of 111 Villages and 9 Panchayats. It is in the 65 m elevation (altitude). This Place is in the border of the Palakkad District and Thrissur District. Thrissur District Pazhayannur is west towards this place. Total population of Alathur Taluk is 422,229 living in 88,397 houses, spread across total 111 villages and 9 panchayats. males are 204,994 and females are 217,235.

Methodology

The subjects were asked to wash their mouths thoroughly and wipe it dry with neat dry towel. The lipstick was then applied with a single stroke, evenly on the vermillion border. The subjects were asked to rub both the lips to spread the applied lipstick. After two minutes, a strip of cellophane tape was cut out with scissors**.** Over the lip stick, the glued portion of cellophane tape strip was placed and the subject was asked to make a lip impression gently in the normal rest position of the lips.

Then the tape was carefully lifted from the lip from one end of the strip to the other, and then the strip of cellophane tape cellophane strip was stuck to the white bond paper for permanent record purpose (If the print was not satisfactory, the above steps were repeated). Lip Impression was taken

on bond paper too for safety sake. The subject's name age, sex and serial number were written on the bond paper beside the stuck strip of cello tape comprising the lip impression. The subject was provided with tissue paper to clean the lips. The lip prints were then examined with the help of 10X magnifying lens and the analysis carried out.

The grooves of lip prints were classified according to Suzuki and Tsuchihashi classification (Table 1 and Fig 1). This classification is the one most commonly used for recording lip patterns.

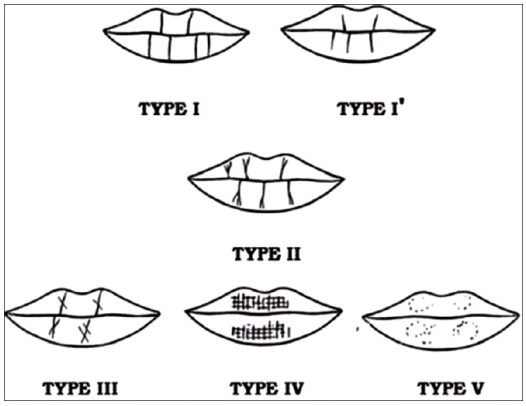

Figure 1.Suzuki and Tsuchihashi (1970) Classification Of Lip Prints

Table 1. Suzuki And Tsuchihashi (1970) Classification Of Lip Prints

Types Of Lip Print	Patterns Of Lip Prints
Type I	Vertical grooves
Type I'	Partial length across the lip grooves of type I
Type II	Branched grooves
Type III	Intersecting grooves
Type IV	Reticular grooves
Type V	Other patterns

For clear categorization of the lip pattern, each lip print was measured for its length and divided four quadrants in a lip print: Upper lip right, upper lip left, lower lip right, lower lip left.

Total numbers of horizontal lines, vertical lines, partial vertical lines, Y shaped pattern, intersected pattern, number of boxes and undetermined pattern were counted by using 10X magnifying glass in each part of every lip print of all the subjects and data tabulated. To avoid bias, all the lip prints were compiled, analyzed and interpreted.

Table 2. Percentage Of Lip Print Patterns In Palakkad

Lip patterns	Female		Male		Total	
	No.	%	No.	%	No.	%
Type I	56	60.87	7	17.5	63	47.73
Type I'	9	9.78	4	10	13	9.85
Type II	1	13.04	12	30	24	18.18
Type III	5	5.44	13	32.5	18	13.64
Type IV	7	7.61	2	5	9	6.81
Type V	3	3.26	2	5	5	3.79

Table 3. Lip Patterns of Males And Females of Palakkad

Pattern	Males (40)		Females (92)	
	No.	%	No.	%
Type I	46	28.75	233	63.31
Type I	15	9.37	21	5.7
Type II	44	27.5	69	18.8
Type III	45	28.12	28	7.6
Type IV	8	5	13	3.52
Type V	2	1.26	4	1.07

ULRQ – Upper Lip Right Quadrant

ULLQ - Upper Lip Left Quadrant

LLRQ– Lower Lip Right Quadrant

LLLQ– Lower Lip Left Quadrant

Results

Lip Patterns in Palakkad

All five types of lip patterns were observed in Palakkad. The most encountered lip pattern was Type I (47.73%). It was followed by Type II (18.8%), Type III

Table 4. Percentage Of Lip Print Patterns In Palakkad In Different Lip Quadrants

Lip Pattern	Sex	ULRQ	ULLQ	LLRQ	LLLQ
Type I	Males	35	30	30	20
	Females	73.9	71.74	57.61	50
Type I'	Males	7.5	10	7.5	12.5
	Females	3.26	6.52	4.34	8.69
Type II	Males	30	22.5	30	27.5
	Females	13.04	11.95	25	23.91
Type III	Males	20	30	27.5	35
	Females	3.26	3.26	10.87	13.04
Type IV	Males	5	10	5	5
	Females	4.34	3.26	2.17	4.34
Type V	Males	2.5	0	0	0
	Females	2.17	1.08	1.08	0

(13.64%), Type-1'(9.85%), Type IV (6.81 %) and just (3.79%) of Type V (Table.2).

Comparison of Lip Patterns of Males and Females in Palakkad

Among 92 females, 60.87% had Type I lip pattern. The pattern least encountered was Type V i.e. 3.26%. Among the males only 17.5% showed Type I pattern. The most prominent pattern among the males was Type III (32.5%). While 30% of males had Type II pattern, 10% showed Type I',

5% showed Type IV and 5% showed Type V pattern too. This clearly brings out a picture of variation in lip print pattern among males and females (Table-2).

Most Prominent Lip Pattern in Palakkad

The most prominent lip pattern among individuals in Palakkad was Type I (47.73%). Among males, Type II and Type III patterns were observed in almost equal numbers. The least encountered pattern was Type V (5%). Among females Type I dominated. The least encountered pattern was Type V (3.26%) (Table-2).

Variation of lip patterns in the four lip quadrants among individuals of Palakkad

Upper Lip Right Quadrant

In the upper lip, among females 73.9% had Type I pattern in the right quadrant. In the upper lip, among males only 35 % had Type I pattern in the right quadrant. In the upper lip, among females 3.26 % had Type I' pattern in the right quadrant. In the upper lip, among males only 35 % had Type I' pattern in the right quadrant. Type II pattern was observed in the upper lip right quadrant of 13.04 % cases of females and 30% of males. In the right upper quadrant, Type III was seen in 3.26 % females and 20% of males. Type IV and Type V patterns were observed in 4.34% and 2.17% of female lips respectively. Type II pattern was seen 30% of male lips in this quadrant. Type III was observed in 20% cases. Type IV and Type V patterns were observed in 5 and 2.5% of male lips respectively (Table-4).

Upper Lip Left Quadrant

In the upper lip, among females 71.74 % had Type I pattern in the left quadrant. In the upper lip, among males only 30 % had Type I pattern in the left quadrant. In the upper lip, among females 6.52 % had Type I' pattern in the left quadrant. In the upper lip, among males only 10 % had Type I' pattern in the left quadrant. Type- II pattern was observed in the upper lip right quadrant of 11.95 % cases of females and 22.5 % of males. In the left upper quadrant, Type III was seen in 3.26 % females and 30% of males. Type IV and Type V patterns were observed in 3.26 % and 1.08 % of female lips respectively. Type IV pattern was seen 10% of male lips in this quadrant. Type V pattern was not observed in this quadrant in males (Table-4).

Lower Lip Right Quadrant

In the lower lip, among females 57.61% had Type-I pattern in their right quadrant. In the lower lip, among males only 30 % had Type-I pattern in the right quadrant. Type I' pattern was observed in only 4.34% cases of females in this quadrant. 7.5 % cases of males had Type I' pattern in the right quadrant. 30% of male lips had Type II pattern in this quadrant compared to 25% of female lips. Type III was observed in 30% cases of male lips but just 3.26% of female lips. Type V pattern was observed in 1.08 cases of female lips and completely absent in male lips (Table-4).

Lower Lip Left Quadrant

In the lower lip, among females 50% had Type I pattern in the left quadrant. In the lower lip, among males only 20 % had Type I pattern in the left quadrant. Type I' pattern was observed in only 8.69 % cases of females in this quadrant while 12.5 % cases of males had Type I' pattern in the left quadrant. 27.5 % of male lips had Type II pattern in this quadrant compared 23.91% of female lips. Type III was observed in 35% cases of male lips but just 13.04% of female lips. Type V pattern was not observed in this quadrant in both female and male lips (Table-4).

Discussion

Personal identification tools are very essential in these days of increasing crime, thefts, frauds and natural calamities. It is necessary for detecting unknown dead people in homicide, suicide, accident or a mass disaster. It is also very useful to trace down missing individuals and also to identify culprits or fraudsters hiding their identity. If a definite description of the different parts of the upper lip and the lower lip are established for an individual through a detailed study, this ante-mortem record can be used for matching the details of lip prints in postmortem records for personal identification[11].

Type I pattern was observed more in all quadrants especially in the case of females. Our results agree with the work of authors[12]. Type I was the most frequent pattern encountered in Mumbai. Our results agree with the results among Nepalese population of other researchers[13]. Surprisingly Type IV pattern was found to be prominent among Keralites in their work carried out at Bangalore[3]. But they have specified that the reticular pattern prominent in Type IV was observed in the middle red portion of the lip. The quadrants have not been specified. It is likely that a clearer picture will emerge if more number of individuals are screened. In all likelihood a new method of cheiloscopy should be designed in which, instead of the four quadrant format, each lip can be marked out into three regions – right, middle and left regions. Thereby six regions can be screened and a clear pattern may emerge.

This study was carried out on 132 individuals only. In the present work, Type IV pattern was observed in just 5% of males and 4.34% females. Other works on Indian subjects have yielded varying results. Type III was predominant in a study of lip prints of Indo-Dravidian population[13]. Type I' is the most predominant pattern in first and second quadrant, while Type II is predominant in third and fourth quadrant among males and females, Type I pattern was predominant in all the quadrants[14]. Type III pattern is the most predominant pattern in the study population (31.3% males and 33.3% females) followed by Type I, Type II, Type IV then Type V pattern[15].

The most encountered lip pattern was Type-I (47.73%). It was followed by 18.8% Type II, 13.64% Type III, 9.85% Type I', 6.81 % Type IV and just 3.79% of Type V.

Among 92 females, 60.87% had Type-I lip pattern. The pattern least encountered was Type V i.e. 3.26%. Among the males only 17.5% showed Type I pattern. The most prominent pattern among the males was Type-III (32.5%). While 30% of males had

Type II pattern, 10% showed Type-I', 5 % showed Type IV and 5% showed Type V pattern too. The rarity of Type V observed in Palakkad has also been reported by another researcher[5]. The most common lip print pattern among males and females both was the intersecting type while the least common was the reticular groove pattern V. This was in contrast to study done among Goan population, where Type V pattern was most predominant pattern by researcher[16]. Type III pattern was predominant in a study of lip prints of Indo-Dravidian population[13].

Various studies have shown that the lip print patterns formed revealed a population wise dominance. In other words, particular populations show predominance of a particular lip print type. This makes it a potentially useful tool for identification This may soon find a place in Aadhar cards, which is now used as an authentic identity card in India.

Cheiloscopy is a relatively new field among the large number of identification tools available to the forensic expert. Work on this subject has already elicited useful information such as that lip prints are unique to an individual and can be used to fix the identity of a person; that they remain stable over time and that lip prints show gender difference[7, 12, 17]. Further work on the subject can help us understand why cheiloscopy can become a practical reality at the ground level of the forensic identification process.

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