Cheiloscopy–An Efficient Method for Gender Dimorphism

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Abstract

Lip print is an anatomical character of the human lips. In forensic identification, lip print patterns can lead us to important information and helps in person's identification. The grooves present on human lips (Sulci labiorum) are unique to each person and can be used to determine identity. Fingerprints, post-mortem reports and of late, DNA fingerprinting, have been successful in person identification in the field of forensic science. Just as in these method, lip prints can be instrumental in identifying a person positively and can be used to verify the presence or absence of a person at the scene of crime . Cheiloscopic techniques have an equal value in relation to other types of forensic evidences for personal identification**Material & method:**- The study was conducted on 100 students of age group 18-25 yrs. Lip stick was applied on each individual and the lip-print was obtained on a paper. The lip impression patterns were studied, classified and recorded using magnifying lens with light.**Result**:- Lip patterns are unique for the individual and no two patterns are identical to each other . In study population,Type III pattern was most common in male while In females predominant pattern was type I. Thus in medico legal case, due to clear differentiation in sexes it is easy to identify person and gender. **Conclusion:**- Cheiloscopy can be reliable method for personal identification and gender dimorphism.

Keywords: *Lip prints, cheiloscopy, personal identification, sex determination*

Introduction

In the field of forensic science, it is important to verify the presence or absence of a person at the scene of crime and to establish person's individuality for legally as well as humanitarian purpose. For identifying it is also essential to determine the gender of an individual[1].

Various well known implanted method of person identification like fingerprints, anthropology, odontology, DNA analysis, iris scan,post mortem findings and other techniques that determine gender, approximate age, height, etc., have been successfully used**.** Just as in these method, lip prints can be instrumental in identifying a person positively. It is least invasive and cost effective procedure among all[2,3,4].

Lip print is an anatomical character of the human lips. "It is defined as the normal lines and fissures present in the form of wrinkles and grooves that are located in the transition zone of the human lip, between the inner labial mucosa and the outer skin, the examination of which is referred as cheiloscopy[5,6].

Lip prints are not affected by injuries, environmental changes and diseases. The grooves present on human lips (Sulci Labiorum) are unique to each person. As lip prints remain unchanged throughout the life, based on their characteristic arrangements cheiloscopic techniques have an equal value in relation to other types of forensic evidences for personal identification[7,8].

For identification purpose, lip print left in crime scene can be used as the evidence to compare with that of the suspect. Cheiloscopy as a tool for identification was

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first recommended as early as 1932 by Edmond Locard (1877-1966), one of France's greatest criminologists[9].

By 1950,in textbook on homicide cheiloscopy was described as a method of identification[10]. In 1967, Santosclassified and divided lip groove into four types for the first time namely[11,12].

1. Straight line
2. Curved line
3. Angled line
4. Sine-shaped curve

Suzuki and Tsuchihashi, in 1970, devised a classification method of lip prints, which follows[13,14]. (Figure 1, 2).

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.

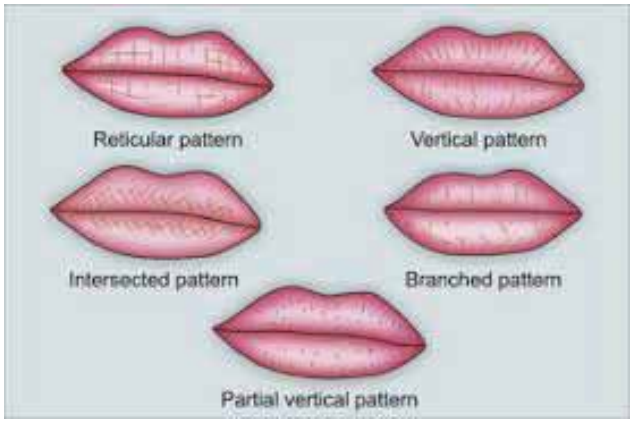

Figure 1: Various lip print patterns

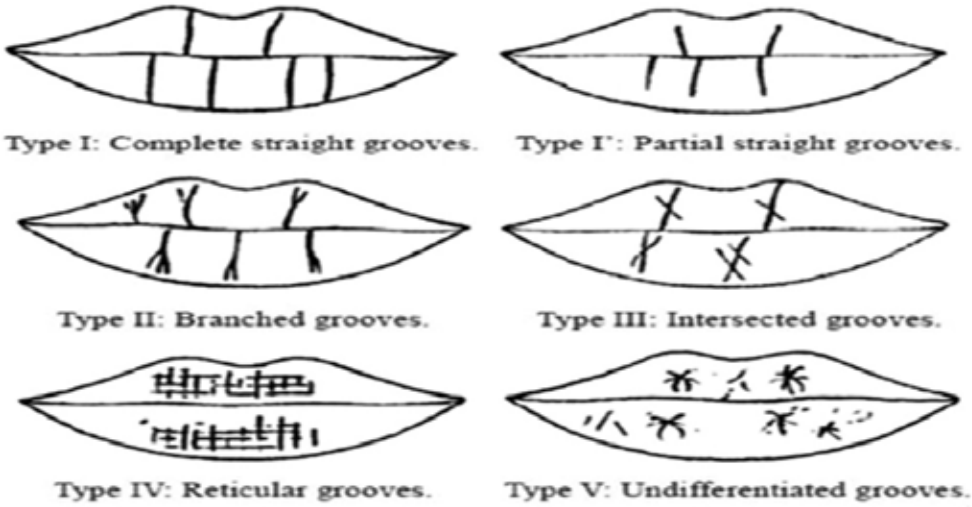

Figure 2: Pictorial representation of pattern of lip prints by Suzuki and Tsuchihashi (1974)

In literature, these are most widely used classifications. For discrimination of the sex of an individual, Vahanwahal and Parekh (2000); Sivpathasundaram, *et al.* (2001) gave coding as Type I, I′, II patterns are dominant in females and Type III,IV,V are dominant in males[15,16].

Researchers suggested that lip prints are suitable for comparison, analysis and identification of a person[17,18]. The present study is undertaken with aim to study the predominant type of lip patterns in study population and to correlate it for identification of gender.

Material and Method

A cross sectional descriptive study was conducted in department of Forensic medicine after approval of institutional ethical committee.

The purpose of the study was briefed to all the

participants and written informed consent was obtained from each of the participants.

The study was conducted on 100 students from 2nd MBBS at MGM's Medical College Aurangabad. Male and female students of age group 18-25 who were willing to participate,whose lips were free from any pathology, had normal transition zone between the mucosa and skin included in study group. Those having gross deformities of lip (cleft lip, ulcers, scar, trauma, inflammation, lesions) heavy smokers, allergy to lipstick were excluded from study.

A dark colored frosted lipstick, thin bond paper, a magnifying lens, cellophane tape, pen/pencil were required as a study material.

The lips were cleaned and a thin layer of red/brown colored lipstick was applied on the lips. he person was asked to rub both the lips to spread the applied lipstick evenly A sheet of bond paper was folded and the "hinged" portion of the paper was inserted in between the lips and subjects were asked to press their lips onto it. It was then "unfolded" again. The cellophane tape was pasted on bond paper to preserve the record. The lip prints were coded according to name and sex of an individual.

A horizontal line dividing upper lip from lower lip and a median vertical line dividing lips into two halves was drawn. Thus,lip prints were divided in first right upper, second left upper, third left lower and fourth right lower quadrants for identification of a person. The number of lines and furrows, their length, branching and combinations in each quadrant were noted using magnifying lens in light . Analysis of lip patterns was done based on the classification system given by Suzuki and Tsuchihashi in 1970[13].

For determination of sex middle 10 mm of lower lip was selected due to numerically supremacy and clear visibility of the lines[15,19].Most common pattern of lip prints in male and female was determined, also similarity of lip prints between two impressions was studied.

Statistical analysis was done using statistical package for social science (SPSS). Ver16. The frequency of each type of lip print was tabulated and the percentage of each type was calculated. For gender identification the data was analyzed with Chi-square test using Yate's correction and a *P*-value less than 0.05 was considered as significant. Analysis of all the lip prints was done by two observers independently and evaluation of data was done to eliminate any subjective bias.

Findings: The study was conducted on 100 subjects including 50 males and 50 females. In each subject,lip print pattern was different in all four quadrants also multiple patterns were observed in each single quadrant. Hence we can conclude that no two lip prints are identical to each other and are unique for the individual. This can help in identification of an individuals as well as the gender.

Most common lip patterns in total study population, in males and females were determined, presented in Table 1 and graphically represented in Figure 3,4.. In males predominant pattern was Type III, followed by type IV. Type I', V, II, I followed next. In females predominant pattern was type I, followed by type I' and type II. Type III, IV, V followed next.

Identification of sex was correctly possible in 43 males and 45 females, while there was error in correct reporting of gender in 07 males and 05 females. Thus in medico legal case, due to clear differentiation in sexes it is easy to identify person and gender. (Table-2).

Table 1: Lip print pattern distribution in male and females

Type of lip print	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
I	02	04	23	46	25	25
I'	03	06	16	32	19	19
II	02	04	06	12	08	08
III	25	50	02	04	27	27
IV	15	30	02	04	17	17
V	03	06	01	02	04	04
Total	**50**	**100(%)**	**50**	**100(%)**	**100**	**100(%)**

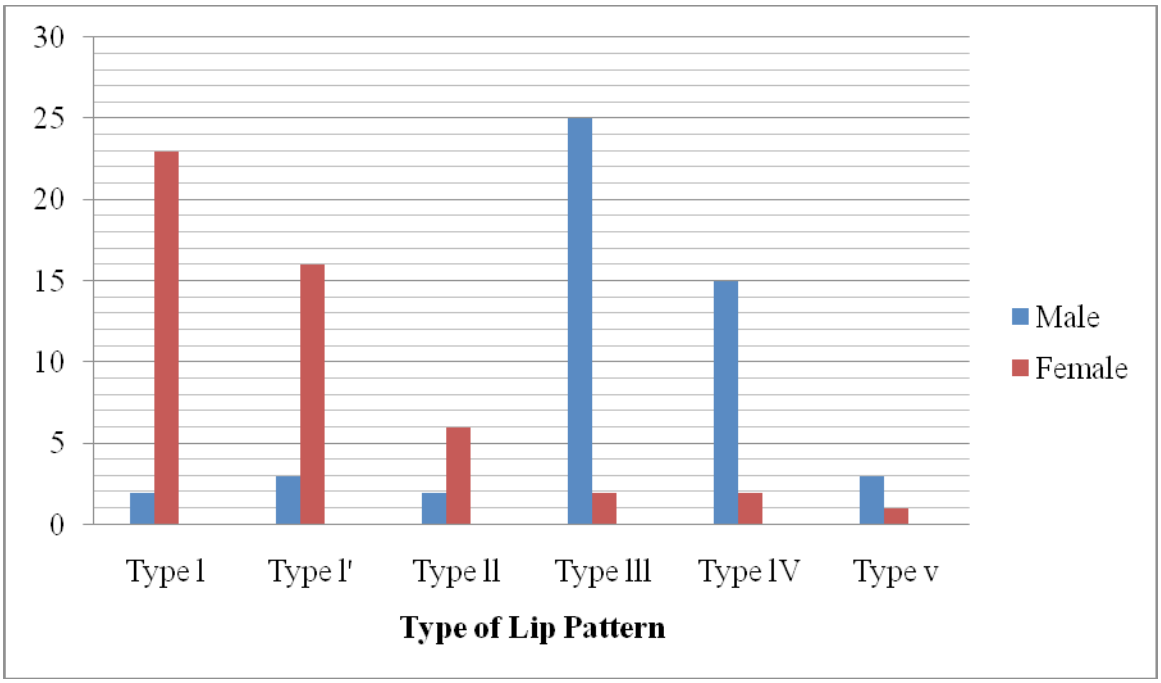

Figure 3: Bar diagram of Lip print pattern distribution in male and females

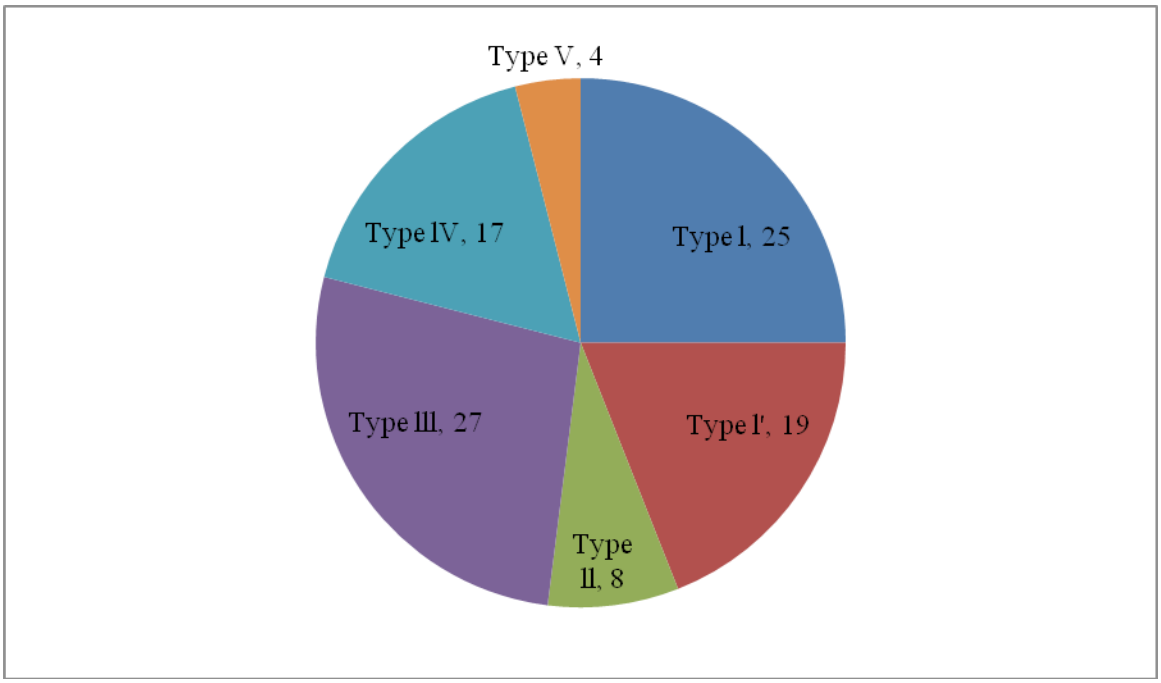

Figure 4: Pie diagram showing type of Lip pattern in study population

Table 2: Gender identification from type of lip prints in study population

Study population	Correct diagnosis of gender	Wrong diagnosis of gender
Males	43	07
Females	45	05
Total	88	12

$r^2 = 0.345$, $P > 0.05$

Discussion

"Identity" is a set of physical characteristics, functional or psychic, normal or pathological- that define anindividual.

Identificationi e. determination of individuality of a human is a prerequisite for personal, social and legal reasons and to certify death[20]. Classification of unidentified body or a trace into groups of age, sex, race, height narrows the possibilities for identification. More the unique characteristics, smaller is the group of comparison[20,21].

Lip prints are recognizable from the 6th week of fetal life. They are not affected by environmental changes, pathologies, minor trauma and inflammation. When lips are impressed onto variety of surfaces (like photographs, glass, papers, windows cutlery, cigarette) the visible morphology and patterns produced by them are important tool for identification of aperson. Due to the specific pattern of grooves and wrinkles in lips, cheiloscopy has become an important antemartem identification procedure and a source of circumstantial evidence. It can conclude the character of the event, number and sex of person involved, cosmetics used, habits, occupational trails and pathology present in lip itself[22].

This study was carried out to study the predominant type of lip patterns in study population and for identification of gender from it. In all subjects no two patterns were identical, this finding correlate with the study of Tsuchihashi and Suzuki et al [13]. This proves the uniqueness of lip patterns. We have excluded subjects having cleft lip, ulcers, scar, trauma, inflammation, lesions as these can be the identification mark themselves. In our study, we found Type III and Type IV lip prints commonly seen in males and Type I, I' and II commonly seen among females. This is in agreement with study by Sharma BS et al.[23] from this it can be concluded that cheiloscopy can be a mean for identification and gender estimation with good accuracy and reproducibility. Post mortem changes in lip pattern from cadaver should also be taken into consideration as studied by Utsuno et al.[24]

Conclusion

Cheiloscopy plays important role in establishing identity of an individual. Among various various method such as finger prints, DNA analysis,Iris scan, anthropology, dental records, cheiloscopy is cost effective, non invasive and reliable method of personal identification. From our study and available literature we can conclude that cheiloscopy can be reliable method for identification.

Lip prints are accepted as identification mark in some places, it needs further studies with advanced procedures in large population of different races, family members, twins and siblings. There is need of development of standard procedure for collection, development, study, documentation and comparison of individual detail of lip prints so that data base of lip prints of individuals located in geographical area can be created.

Conflict of Interest: None declared

Source of Funding: Self

Ethical Clearance: This opic is approved by Ethics Committee for research of Human Projects, MGM' medical college, Aurangabad.

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