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Original Research Article

Cheiloscopy–A Novel Tool for Personal Identification and Sex Determination

Dr. Ankur Bhargava[1], Dr. Sonal Saigal[2], Dr. Ahmad Danish Rehan[3], Dr. Tasnim Kausar[4]
[1]Reader, Department of Oral Pathology, Microbiology & Forensic Odontology, Hazaribagh College Of Dental Sciences & Hospital, Hazaribagh, Jharkhand, India
[2]Lecturer, Department of Oral Pathology, Microbiology & Forensic Odontology, Dental Institute, Rajendra Institute Of Medical Sciences, Ranchi, Jharkhand, India
[3]Reader, Department of Oral Pathology, Microbiology & Forensic Odontology, Hazaribagh College Of Dental Sciences & Hospital, Hazaribagh, Jharkhand, India
[4]Consultant, Department of Microbiology, Arogyam Hospital, Hazaribagh, Jharkhand, India

***Corresponding author:** Dr. Sonal Saigal
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Abstract

Introduction: Identification of human being is always a problem for scientists and is based upon scientific principles. Finger prints, dental data, anthropometry & DNA analysis are the tools used for identification purposes. The new arriving tool in the field of personal identity is cheiloscopy i.e. study of lip prints which are unique for every individual and behold the potential for identification purpose. If lip prints are found at scene of crime, the presence or absence of a person can be ruled out from the scene of crime. ***Aim:*** The objective of the study was to check for any peculiar lip patterns in relation to the sex of the individual and determine the most common lip patterns by using Suzuki &Tsushihashi's classification. ***Materials and methods:*** A study group of 100 undergraduate students (50 males and 50 females) in the age group 18-23 years were chosen randomly from our institute. Non-glossed lip stick color, white bond paper, cellophane tape, scissors, and magnifying lens were used to obtain lip prints and analyzed with the help of a personal computer and Adobe photoshop software. The lip print pattern of middle part of lower lip was considered, as it is visible in almost all the prints. ***Result:*** Majority of the study group (28 people -28%) belonged to Type IV and 6 people (6%) belonged to Type V group. The most common pattern found in female was II, while type IV was predominant among males. ***Conclusion:*** Studies show lip prints have great potential to establish individuality, show gender variation and remain unchanged forever.

Keywords: cheiloscopy, Suzuki, gender variation.

INTRODUCTION

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 [1]. Lip prints are normal lines and fissures in the forms of wrinkles and grooves present in the zone of transition of human lip, between the inner labial mucosa and outer skin, examination of which is known as cheiloscopy. This is unique for individuals, as finger prints [2]. 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 methods, 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 [3]. Lip print is an anatomical character of the human lips [4]. Cheiloscopic techniques have an equal value in relation to other types of forensic evidences for personal identification [5] and sex determination. One of the challenges faced by man in earlier days was to establish the identity of an individual. The concept of "identity" is a set of physical characteristics, functional or psychic, normal or pathological- that define an individual. Identification of humans is a prerequisite for personal social and legal reasons [6]. In a crime scene investigation, lip prints can link a subject to a specific location if found on cloths or other subjects, such as glasses, cups or even cigarette butts [7]. Analysis of the lip prints left at the scene of crime, and their comparison with those of suspected person may be useful for identification [8]. Dental identification remains one of the most reliable and frequently applied methods of identification, predominantly by the comparison of ante-mortem and post-mortem records [9]. The use of lip prints fall into this category and because they have been proved reliable and trustworthy

to link a suspect to a crime, more emphasis should be given to this field.

MATERIALS AND METHODS

A study group of 100 undergraduate students (50 males and 50 females) in the age group 18-23 years were chosen randomly from our institute After obtaining written informed consent from the subjects, basic details such as personal identification, demographic data, medical and surgical history were obtained and recorded in the proforma prepared. Subjects with congenital lesions, diseases and injuries of lips and persons with known hypersensitivity to lipstick were excluded. To obtain the lip prints of the subjects, dark colored lip stick was applied on each lip evenly using a lip stick applicator. Pieces of cellophane tape measuring 10x 3cm were applied on each lip and lip print was lifted and affixed onto a plain white paper. Images of the lip prints thus obtained were scanned using a HP flatbed scanner. The scanned images were analyzed with the help of a personal computer using the Adobe photoshop software. The lip print pattern of middle part of lower lip was considered for classification, as it is visible in almost all the prints. The pattern is determined based on the numerical superiority of lines in the study area. Lip prints collected were classified based on the classification scheme proposed by Suzuki and Tsuchihashi into 6 types as given in Table-1. After classifying the lip prints into different types, they were compared with each other for determining the uniqueness. The result obtained were subjected to statistical analysis using SPSS (Statistical package for social sciences) version 20 and Chi square test.

RESULTS

The 100 lip prints obtained were classified into 6 types based on the method of classification proposed by Suzuki and Tsuchihashi (Figure-1). Majority of the study group (28 people -28%) belonged to Type IV and 6 people (6%) belonged to Type V group. 18females (36%) belonged to Type II and 21 males (42%) belonged to Type IV (Table-2, Figure-2). This result was statistically significant in determining the gender (p value of <0.001). No two lip prints of the same type matched with each other, and hence considered unique.

Table-1: Suzuki and Tsuchihashi classification of lip print [11]

Type	Description
I	The clear-cut vertical grooves that run across the entire lips
I’	Grooves similar to Type I but do not cover the entire lip
II	Branched grooves (branching Y-shaped pattern)
III	Criss-cross pattern
IV	Reticular patterns
V	Miscellaneous

Table-2: Type of lip print and frequency in the study population

Type of lip print	Type I	Type I’	Type II	Type III	Type IV	Type V
Females	05	14	18	04	07	02
Males	04	10	05	06	21	04
Total	09(9%)	24(24%)	23(23%)	10(10%)	28(28%)	06(06%)

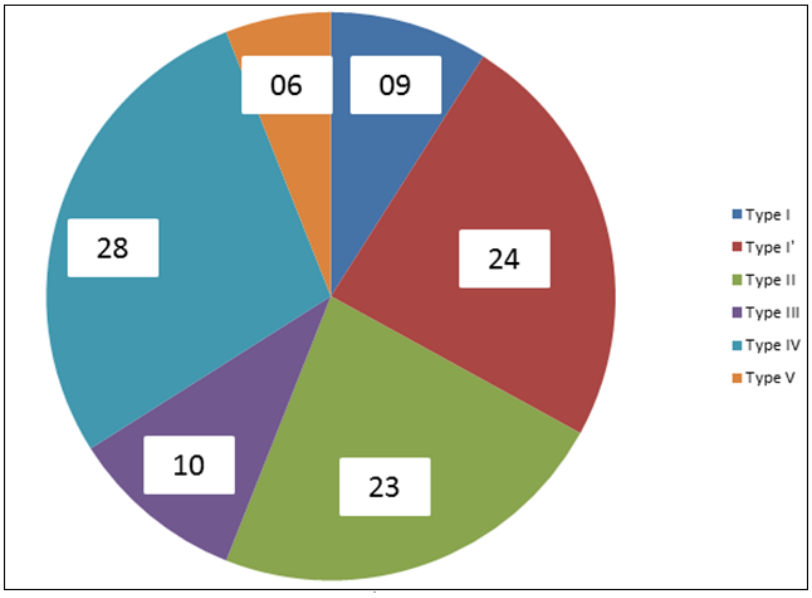

Fig-1: Pie chart of lip pattern among study population

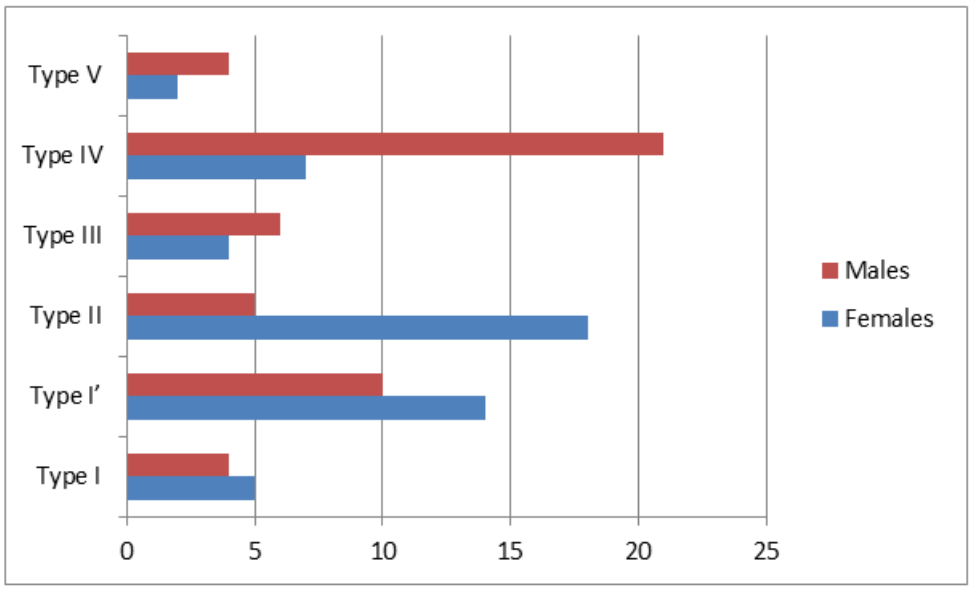

Fig-2: Bar Chart of Frequencies based on gender and type of lip prints

DISCUSSION

Forensic odontology is a valuable component of forensic investigation in many countries. It involves dentist's participation in assisting legal and criminal issues. The application of dental sciences in criminal and legal investigations gathered momentum in the West during the 1950s and 1960s. Cheiloscopy is analogous to fingerprint analysis, and is a genuine subspeciality of forensic odontology [12].

Lip prints bring added evidence to a crime scene that can be valuable, especially in cases lacking other evidence, like fingerprints. Lip prints can be a factor in many different kinds of crimes, such as tape when a person has been bound or gagged, prints on a glass that a person drank from, prints on a cigarette butt, and prints on a glass/window if they were pressed up against it. All of these are potential places where lip prints may be found and used in the investigation of a crime [13].

Like finger prints lip prints are unique and individual characteristics. The use of lip prints for criminal case identification is limited because the credibility of lip prints has not been firmly established in our courts. Found in surfaces like glass, coffee cup, etc. Identifiable as early as 6th week of intrauterine life. They are permanent, unchangeable even after death, and unique to each person except in monozygotic twins. The pattern change very rarely in the life time. Does not change significantly post dead cadaveric lip prints are considered satisfactory for identification purposes. The major problem in lip print analysis is smudging and we can overcome this problem by using a good quality lip stick. Lip print pattern can be of five types based on the Tsuchihashi's classification [11]. A lip print at the scene of crime can be a basis for conclusions as to the character of the event, the number of people involved, sexes, cosmetics used, habits, occupational traits and the pathological changes of lips [14]. The F.B.I. and the Illinois State Police consider that lip prints are unique like fingerprints and are a positive means of identification [3].

In the present study, we aimed to find out the variations in lip patterns of 100 individuals. We tried to ascertain whether the lip prints hold the potential for determination of sex and identity of the individual. Even though the lines and furrows are present, both in upper and lower lip from one corner of mouth to other corner, only the middle portion of the lip is taken into account, since this portion is always visible in any trace. We labeled a particular pattern on the basis of the numerical superiority of types of lines present that is vertical, intersected, branched or reticular. If more than one pattern predominates it is typed as undetermined. In the past some researchers have worked on lip prints to prove that the gender difference does exist in lip print. According to Vahanwala *et al*., [15] Type I, Type I' and Type II patterns were found to be dominant in females while type III, IV and V were dominant in males. In another study by Vahanwala and Parekh, it was shown that all four quadrants with the same type of lip prints were predominantly seen in female subjects and male subjects showed the presence of different pattern in a single individual. Similar kind of results found to Sharma and Saxena [16], Satyanarayan, Prabhu [3, 17]. We also found type I, type I' and type II patterns to be dominant in females while type IV and type V patterns were dominant in males. In addition, we observed that no lip prints matched with each other and that lip pattern was unique to every individual thus aid in personal identification.

CONCLUSION

Lip prints are unique and hence can be used as a tool for personal identification. Majority of the study population belonged to Type IV (28%) and Type I' (24%) ranking next. Type V (6%) was the least type of lip print in the present study group. Type II (36%) was common in females and Type IV (42%) was common in males which was statistically significant in determining the gender (p value <0.001). Thus, lastly we conclude that, as each lip print pattern is unique and can help in identity of the individual. If, police keep records of lip prints with them along with fingerprints, it will help to solve the crime and can justify the real sinner.

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