Original Communication

Lip prints – An Important Tool in Personal Identification

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Abstract:
The study of lip prints is known as cheiloscopy. It is used for the personal identification since lip prints are unique for individuals and do not change during the life of a person. The present study was conducted on 100 South Indian students of 18 to 24 years of age in the Department of Forensic medicine and toxicology, JJM Medical College, Davangere, Karnataka to evaluate the lip print patterns in relation to gender and its consistency for a period of time. The lip prints were obtained on the bond paper and studied with the help of a magnifying lens using Suzuki and Tsuchihashi's classification. In males, intersecting lip pattern was the commonest pattern, where as in females, vertical lip pattern was the commonest pattern. No change in the lip prints patterns were observed during one year duration in the sample study.

Keywords: Cheiloscopy, Lip Prints, Suzuki & Tsuchihashi's classification, Identification

Introduction

Establishing a person's identity can be a very difficult process. Dental, fingerprint and DNA comparisons are probably the most common techniques used in this context, allowing fast and secure identification processes. However, since they cannot always be used, sometimes it is necessary to apply different and less known techniques. And one of the most interesting emerging methods of human identification is human lips recognition.[1]

Lips are two fleshy folds surrounding the oral orifice. They are lined externally by skin and internally by mucosa. The skin is continuous with the mucosa at the transitional or Vermilion border, a reddish zone covered by the thin keratinized epithelium. Epithelium of the vermilion area exhibits a less well developed stratum corneum than skin.[2,3]

The external surface of lip has numerous elevations and depressions that form a characteristic pattern, referred to as lip prints, study of which is known as cheiloscopy.

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Lip prints can be obtained at the crime scene from clothing, cups, glasses, cigarettes, windows and doors.[4]

Lip prints are unique and do not change during the life of a person.[5] It has been verified that lip prints recover after undergoing alterations like minor trauma, inflammation and diseases like herpes.[6] The form of the furrows does not vary with environmental factors. However, major trauma to the lips may lead to scarring, pathosis and the surgical treatment rendered to correct the pathosis may affect the size and shape of the lip, thereby, altering the pattern and morphology of grooves.[7] The lip prints of parents and children and those of siblings have shown some similarities. It has also been suggested that variations in patterns among males and females could help in sex determination.[8]

Aims and objectives

The objective of the study was to evaluate the lip print patterns in relation to gender, and its consistency for a period of time.

Materials and Methods:

The study was conducted on 100 South Indian students of 18 to 24 years of age in the Department of Forensic medicine and

toxicology, JJM Medical College, Davangere, Karnataka. Consent was obtained from each individual and ethical clearance was obtained from the Institutional ethical committee to conduct the study. The study was performed over a period of 1 year. Lip prints of these individuals were recorded at the beginning of the study and were again recorded after one year, in order to check for its consistency. The individuals with inflammation, trauma, malformation, deformity, surgical scars and other pathology of the lips were excluded.

Materials:

The materials used in the present study are as follows: A red-colored frosted lipstick, bond paper, magnifying lens, pen for labeling, tissue paper, water and soap.

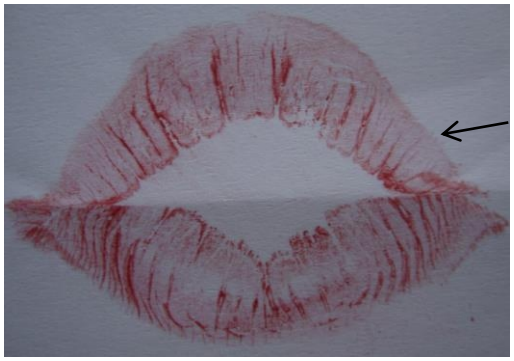
Methods:

A strip of bond paper was taken and then labeled with name, age, sex of the subject. Before the application of the lipstick the subject was asked to clean the lips with water and dry them with tissue paper. A dark colored frosted lipstick was applied on the lips up to the vermillion border. The subject was asked to rub his/ her lips together to spread the lipstick evenly. The paper was folded along the length and was pressed between the two lips of the subject. After obtaining the lip print, the subject was asked to clean his/her lips with warm water and soap. Then lip prints were examined with the help of magnifying lens and patterns of lip prints were studied using Suzuki and Tsuchihashi classification.

The lip prints were classified using the classification given by Suzuki and Tsuchihashi (1970)[9]:

1. Type I – Complete vertical grooves that run across the entire lip.
2. Type I‘ – Partial/incomplete vertical. Similar to type I but do not cover the entire lip.
3. Type II – Branching
4. Type III – Intersecting
5. Type IV – Reticular
6. Type V – Undetermined/Other.

a. Type I : Complete vertical pattern



b. Type I‘ : Partial vertical pattern

b. Type I : Branching pattern

c. Type I : Intersecting pattern

c. Reticular pattern

Results

In the present study, it was found that, in males, Type III (Intersecting - 44%) was the most prominent pattern, followed by Type I (Complete vertical - 20%), Type IV (Reticular - 16%), Type I‘ (Incomplete vertical - 8%), Type II (Branching - 8%) and Type V (Undetermined - 4%). In females, Type I (Complete vertical - 44%) was the most prominent pattern, followed by Type II (Branching - 24%), Type I‘ (Incomplete vertical - 18%), Type III (Intersecting - 8%), Type IV (Reticular - 4%), and Type V (Undetermined - 2%). Further it was found that in both boys and girls, Type I (Complete vertical - 32) lip print was the most prominent pattern, followed by Type III (Intersecting - 26%), Type II (Branching - 16%), Type I‘ (Incomplete vertical - 13%), Type IV (Reticular - 10%), and Type V (Undetermined - 3%). (Table 1)

Lip prints of all subjects were recorded twice, once at the beginning of the study and again after one year. The lip prints of all individuals showed a consistent pattern, without any gross difference after 1 year.

Table 1: Distribution of lip prints patterns in males and females

Lip print pattern	Male [n (%)]	Female [n (%)]	Total [n (%)]
Type I (Vertical)	10 (20%)	22 (44%)	32 (32%)
Type I’ (Partial Vertical)	4 (8%)	9 (18%)	13 (13%)
Type II (Branching)	4 (8%)	12 (24%)	16 (16%)
Type III (Intersecting)	22 (44%)	4 (8%)	26 (26%)
Type IV (Reticular)	8 (16%)	2 (4%)	10 (10%)
Type V (Undetermined)	2 (4%)	1 (2%)	3 (3%)

Discussion

Identification of unknown individuals (living or dead) is a vital part of the forensic practice and this is based on the theory that all individuals are unique. All the individuals bear some unique characteristic, which make the positive identification possible. One of those unique traits is lip print which do not change during the life of a person.[5] A series of forensic studies on the morphology of the lips and the pattern produced when they are produced onto a variety of surfaces has been done which forms an important tool for personal identification.[6] Lip print pattern examination can help in DNA detection from lip print smear, gender determination, uniqueness of lip print to any blood group, etc.[10] which can be the mainstay of human identification. Apart from living, cheiloscopy can also be used for the identification of a dead person, but for this ante-mortem data of lip prints of the individual concerned must be available which cannot be expected in cheiloscopy and this obviously impairs a comparative study where identification of dead person is concerned.

Lip prints can be present on photographs, cigarette butts, drinking glasses, cups, letters, window panes, etc. examination of which can provide a large information which can be used in the reconstruction of the events and identifying suspects. A lip print at the scene of crime can be basis for conclusion as to the character of the event, the number and sex of the people involved, cosmetics used, habits, occupational trials and the pathological changes of the lips themselves.

This study was carried out to evaluate the lip print patterns in relation to gender, and its consistency for a period of time. In our study, Type III (Intersecting) pattern was found to be dominant in males. Similar findings were noted in the studies conducted by Tsuchihashi[6], Gondivkar et. al.[11], Vahanwala et. al.[12], Bajpai et. al.[13], and Saraswathi et. al.[14]. In females, we found Type I (Complete vertical) to be the most common pattern, which is in concurrence with the studies of Vahanwala et. al.[12], Bajpai et. al.[13], and Sharma et. al.[15]. In both boys and girls, Type I (Complete vertical) pattern was the most prominent pattern which is also supported by the study of Vahanwalla and Parekh[16]. In some other studies in Karnataka, Rastogi et. al.[17] has reported Type I to be predominant in males whereas Types II (Branching) and III (Intersecting) in females; Verghese et. al.[18] found that Type IV (Reticular) was the predominant type in both males and females.

Conclusion

Lip prints can help investigators in positive identification of living or deceased. This procedure requires further studies with larger sample size. A standard and uniform procedure has to be developed for the collection, development and recording of lip prints and the ensuing comparison. Its application in the forensic field should be widely accepted by both law enforcement and the legal professionals

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