



Forensic Cheiloscopy in the Process of Individual Identification

Karamustafić Vildana^{1*}, Zukić Selma², Bajzman Anita² and Vuković Amra²

¹Dental Practice "DentIN", Gornji Vakuf-Uskoplje

²Dental Medical School Sarajevo; Department of Tooth Morphology, Dental Anthropology and Forensics

*Corresponding Author: Karamustafić Vildana, Dental practice "DentIN", Gornji Vakuf-Uskoplje.

DOI: 10.31080/ASDS.2020.04.0793

Received: January 27, 2020

Published: February 25, 2020

© All rights are reserved by Karamustafić Vildana., et al.

Abstract

Identification is procedure of establishing a person's identity. Forensic cheiloscopy is the method that is used to identify the person, based on characteristics arrangement and shape of lines that appear on the vermilion part of the lips. The lip prints are fixed, permanent and enable the establishment of classification.

The purpose of this research is to validate the uniqueness of lip print according to the analysis of the system of grooves which are located at the vermilion of lips, determine the predominant patterns at all participants, as well as the predominant patterns separately at male and at female participants and also to identify existence of individual morphological characteristics at lip prints.

Research was conducted on 40 participants, including 20 male and 20 female participants. The lip prints are classified according to the Tsuchihashi classification from year 1970. The results have shown that two identical lip prints does not exist. The most frequent pattern in overall participants population was pattern Type I, followed by pattern Type II, Type III, Type I', Type V and Type IV.

Lip prints are extremely useful in both forensic investigation and individual identification. It can be often found at the crime scene and considered as the most important form of evidence. This is corroborated by the fact that today is developed software for lip print analysis.

Registration of lip prints could be part of standard dental procedure. In this case, a database would be created, and could be used for comparisons in the identification.

Keywords: Identification; Forensic Cheiloscopy; lip Print

Introduction

Identification is procedure of establishing a person's identity [1]. For individual identification we can use the biometric methods, which include physical methods (identification based on facial recognition, fingerprint, hand geometry, dental methods, DNA) and behavioural methods (signature, voice) [2,3].

Dental, fingerprint and DNA comparisons are probably the most common techniques used in this context, allowing fast and secure identification processes. Today, however, investigators can also rely on lip prints to identify possible suspects or to support evidence gained in specific investigations [4,5].

The vermilion border has minor salivary glands and the edges of the lips have sebaceous and sweat glands [6-8]. The secretions of oil and moisture from these enable development of latent lip prints in most crime scenes, analogous to latent finger prints [9,10].

The wrinkles and grooves on the labial mucosa (sulci labiorum) are unique, do not change during the life of and it is possible to use lip prints in forensic identification [11]. Cheiloscopy deals with examination of system of furrows on the red part of human lips [12,13].

The application of modern technologies in the field of electrical engineering and computer, through modern hardware devices and software tools, the new identification methods are more used [14].

The motives for choosing these topics are the facts that research studies and information regarding the use of lip prints as evidence in personal identification and criminal investigation in forensic dentistry are very much scanty, but exist as a methodology in forensic dentistry. Studying in depth and establishing further facts and truth in lip prints will certainly help as useful evidence in forensic dentistry.

Materials and Methods

This is a review article, and it is used methodologies for the collection and analysis of relevant literature sources. However, in order to show the practical uses cheiloscropy in forensic dentistry and individual identifications, as part of the review article is this study.

Selection of subjects

This study was conducted on 40 subjects, which includes 20 males and 20 females. All the participants were briefed about the purpose of the study and written informed consent was obtained from each of the participants. Care was taken to select individuals having no lesion, whether active or passive on the lips. Individuals with known hypersensitivity to lip stick were not included in the study.

The collected lip prints are coded. This research was work of one researcher.

Materials

- Red coloured lipstick.
- Cellophane tape.
- Thin white paper.
- Magnifying lens.

Methods

The lipstick was applied by the researcher with a single stroke, evenly on the vermillion border. The subject was asked to rub both the lips to spread the applied lip stick. After two minutes, a lip impression was made on the strip of cellophane tape which was then sticks to white thin paper, which served as the permanent record. The collected lip prints are coded. The lip prints of each individual were photographed for documentation. These prints were examined using magnifying glass, classified and analyzed.

In this study, we followed the classification of patterns of lines on lips given by Suzuki and Tsuchihashi [15]:

- Type I: Clear cut vertical grooves that run across the entire lips.
- Type I': Similar to type I, but that do not run across the entire lip.
- Type II: Branched groove (branched y pattern).
- Type III: Intersected grooves.
- Type IV: Reticular grooves.
- Type V: Undetermined [16].

Results

The lip prints were classified using the classification proposed by Suzuki and Tsuchihashi in 1970, also known as Tsuchihashi's classification. The overall patterns of lip prints both in males and females were given in table 1.

Patterns	Type I	Type I'	Type II	Type III	Type IV	Type V	Total
Subjects (%)	32,5 %	12,5 %	25 %	15 %	7,5 %	7,5 %	100%
Subjects (number)	13	5	10	6	3	3	40

Table 1 : Distribution of lip print patterns.

Results of female subjects are in table 2.

Patterns	Tip I	Tip I'	Tip II	Tip III	Tip IV	Tip V	Ukupno
Subjects (%)	45 %	20 %	20 %	10 %	0%	5%	100%
Subjects (number)	9	4	4	2	0	1	20

Table 2 : Distribution of lip print patterns of female subjects.

Photograph of the lip print of a female subject are shown in figure 1.

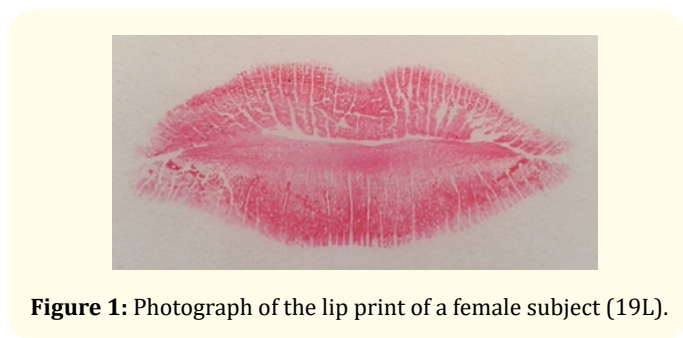


Figure 1: Photograph of the lip print of a female subject (19L).

Results of male subjects are in table 3.

Patterns	Type I	Type I'	Type II	Type III	Type IV	Type V	Total
Subjects (%)	20 %	5 %	30 %	20 %	15 %	10 %	100%
Subjects (number)	4	1	6	4	3	2	20

Table 3: Distribution of lip print patterns of male subjects.

Photograph of the lip print of a male subject are shown in figure 2.

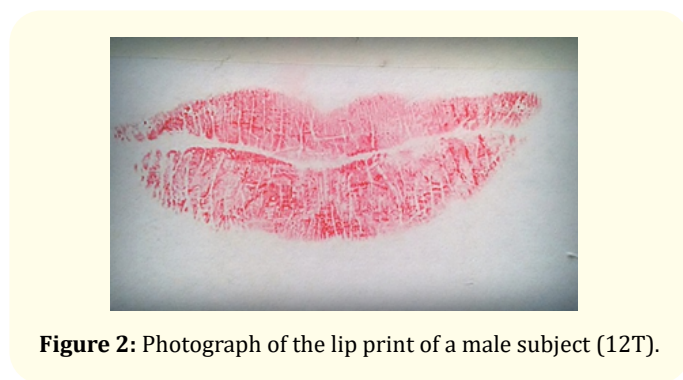
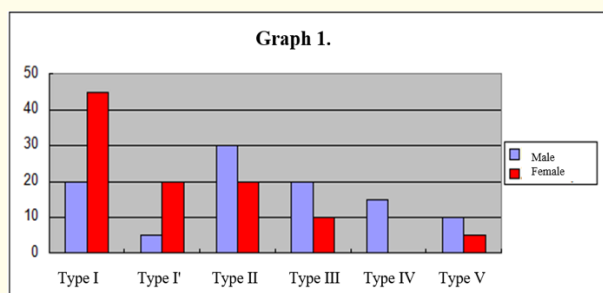


Figure 2: Photograph of the lip print of a male subject (12T).

It was observed that the medial and lateral parts of the lips frequently had different patterns. A detailed observation revealed that each type never occurred singly, but in combination with other types. It was observed that type III and type IV were the most commonly superimposed patterns, which were difficult to differentiate at times.

The overall patterns of lip prints both in males and females were given in graph 1.

The columns are colored differently that be easily noticed the difference.



Graph 1: Association between gender and lip pattern.

In the context of cheiloscopic identification dissimilarity (also termed individuality) consists in the fact that every person's vermillion zone of the lips has a distinct set of fissures.

Most frequent individual elements of the prints are: simple upper furcation; simple lower furcation; Star-like furcation - a number of crossings, a discernible crossing point ; Crossing lines - two lines crossing, a discernible crossing point ("x" pattern).

Discussion

Apart from the teeth and their restorations, soft tissues of oral cavity may help for personal identification. Among the soft tissues, lip prints can be recorded and used as evidence in personal identification and criminal investigation. If the lip print is identified and traced from the material during investigation, it can be compared with the suspected person [17-19].

The lip print pattern is identifiable as early as the sixth week of intrauterine life. Lip pattern is unique for each of the examined individuals, even in twins and family relatives. This finding is hoped to be useful in the identification process, both in civil and criminal issues [20,21].

It has been verified that lip prints recover after undergoing alteration like minor trauma, inflammation and diseases like herpes. The form of the furrows does not vary with environmental

factors [22,23]. 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 [24,25].

The most characteristic groove patterns of human lips could be recorded in a cross line diagram (similar to traditional dental charting of the quadrants), the lip-print diagram [26-28].

In order for it to be possible to use lip prints in forensic identification it is necessary for them to have the three following traits: Individuality (no two lip prints can be identical, even those of monozygotic twins) ; Permanence (the pattern of vermillion zone lines remains the same throughout a person's lifetime); Irremovability: the vermillion zone pattern cannot be removed, even when the epidermis is removed [15].

Individual elements of vermillion zone patterns are: Simple upper furcation; Branching upper furcation; Simple lower furcation; Eyelet - a dark point with a lighter circular fissure ; Crossing lines - two lines crossing ; Star-like furcation - a number of crossings, a discernible crossing point ; Bridge; "Quadrangle" arrangement [15,29].

Jerzy Kasprzak [24] stated that an average of 1145.5 individual properties could be established for one lip print trace whereas in one trace of finger print only 100 individual properties could be differentiated. The determination of nine individual properties is necessary worldwide to establish the identity.

In the study of 600 individuals (Aurangabadu, India) the most predominant pattern in the entire study population, taking both the upper and lower lips together, was type III which constituted 48.2% of all patterns. This was followed in order by type II, type IV, type I, type I' and type V [13].

Another study, conducted in Uttar Pradesh to 100 individuals, of which 50 men and 50 women, showed that the most common form was type I, followed by type IV, type V, type I', Type II, Type III [16].

The results of this study don't match with the extensive research conducted in India.

Unfortunately, in Bosnia and Herzegovina still has not conducted any study of cheiloscropy, so there is no data in the Bosnian population, and it was not possible to compare the results of this study with previous results.

Conclusion

Lip prints can be recorded and used as evidence in personal identification and criminal investigation.

Future research on this topic can help determine the dominant pattern in our population and ease the process of individual identification. The records of lip prints is absolutely noninvasive process, and could help in the identification process. Because of this, it would be recommended think about introduction of new records into standard dental procedure. The database with the lip prints would be same importance in the process of individual identification like dental records with information about dental status and treatment.

Bibliography

- Otašević V., et al. "Sudska medicina". Niš: Prosveta (2002).
- Brkić H., et al. "Forenzična stomatologija". Zagreb: Školska knjiga (2000).
- MA Eldomiaty., et al. "Morphological patterns of lip prints in Saudi Arabia at Almadinah Almonawarah province". *Forensic Science International* 200.1-3 (2010): 179.
- Pyrek KM. "Forensic Science Under Siege". Elsevier Academic Press, USA (2007).
- Vamsi Krishna Reddy. "Lip prints: An Overview in Forensic Dentistry". *Journal of Advanced Oral Research* (2011): 17-20.
- Vuković A., et al. "Osnovi morfologije zuba i dentalne antropologije". Univerzitet u Sarajevu, Stomatološki fakultet Sarajevo (2013).
- Hasanović A. "Anatomija unutrašnjih organa". Sarajevo: Klinički centar Univerziteta, Institut za naučno- istraživački rad i razvoj (2011).
- M Bošković. "Anatomija čoveka". Beograd- Zagreb: Medicinska knjiga (1977).
- B Kućanski. "Plastična anatomija". Ljubljana: Mladinska knjiga (1991).
- A Nagasupriya., et al. "A crime solver". *Journal of Forensic Dental Sciences* 3.1 (2011): 3-7.
- Padmavathi BN., et al. "Gender determination using cheiloscopy". *Journal of Forensic Dental Sciences* 5.2 (2013): 123-128.
- Venkatesh R., et al. "An aid for personal identification". *Journal of Forensic Dental Sciences* 3 (2011): 67-70.
- J Augustine., et al. "Cheiloscopy as an Adjunct to Forensic Identification: A Study of 600 Individuals". *JThe Journal of Forensic Odonto-stomatology* 26.2 (2008): 44-52.
- Radmilović Ž. "Biometrijska identifikacija". Policija i sigurnost (2008).
- E Jurczyk-Romanowska and Forensic cheiloscopy. Individual identification on the basis of lip print. (2014).
- Rohit Malik., et al. "A Deterministic Aid for Forensic Sex Determination". *Journal of Indian Academy of Oral Medicine and Radiology* 23.1 (2011): 17-19.
- Jaspal Singh., et al. "Sex determination using cheiloscopy and mandibular canine index as a tool in forensic dentistry". *Journal of Forensic Dental Sciences* 4.2 (2012): 70-74.
- Dineshshankar J., et al. "Lip prints: Role in forensic odontology". *Journal of Pharmacy and Bioall Sciences* 5 (2013): 95-97.
- Dineshshankar J., et al. "Role in forensic odontology". *Journal of Pharmacy and Bioallied Sciences* 5 (2013): S95-S97.
- Girish R Dongarwar., et al. Method of Person Identification and Sex Determination (2013): 2.
- Saraswathi TR., et al. "Study of lip prints". *Journal of Forensic Dental Sciences* 1 (2009): 28-31.
- Jain AA., et al. "Study of Lip Prints Among the Gujarati Population for Personal Identification". *International Journal of Scientific Research* 2 (2013): 399.
- Petersen LC and Lip Prints". *Journal of Forensic Medicine and Toxicology* 10.1 (2009).
- Gondikvar SM., et al. "Cheiloscopy for sex determination". *Journal of Forensic Dental Sciences* 2.1 (2009): 56-60.
- Prabhu RV., et al. "Cheiloscopy: Revisited". *Journal of Forensic Dental Sciences* 4.1 (2012): 47-52.
- Sharma P., et al. "The study of lip prints in sex identification". *Journal of Forensic Dental Sciences* 1.1 (2009): 24-27.
- L H Adamu., et al. "Ibrahim, Association of lip print and sex among Nigerians". *Nigerian Journal of Basic and Clinical Sciences* (2012): 79-83.
- Vahanvala S., et al. "Study of Lip-Prints as Aid for sex Determination (2005).
- Dwivedi N., et al. "Latent lip print development and its role in suspect identification". *Journal of Forensic Dental Sciences* 5.1 (2013): 22-27.

Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

Website: www.actascientific.com/

Submit Article: www.actascientific.com/submission.php

Email us: editor@actascientific.com

Contact us: +91 9182824667