

## A Morphologic Approach of Lip Prints in a Sample of Albanian Population in Kosovo

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### Abstract

**Background:** Cheiloscopy (lip-print studies) is an important tool for the identification of human bodies in social and criminal issues. Lip prints present the labial mucosa with characteristic grooves and lines specific to every person. The purpose of this study was to analyze the lip prints among an adolescent sample of the Albanian population in Kosovo, to determine the most prevalent lip-print pattern in both genders, and to determine if there are any differences between male and female lip prints.

**Methods and Results:** A total of 100 adolescents aged from 12 to 18 were randomly selected from schools in southeastern Kosovo. The lip prints were classified according to Suzuki and Tsuchihashi's classification (1970). For the analysis, the lips were divided into four quadrants: right upper quadrant, left upper quadrant, right lower quadrant, and left lower quadrant. The analysis was done using a magnifying glass.

In the present study, the slightly prevalent lip-print pattern among all subjects was Type II (25.0%), followed by Type I (20.0%), Type III (17.0%), Type IV (16.0%), Type I' (16.0%), and Type V (6.0%). The lip prints of Type IV were slightly more common in female subjects (24.0%), followed by Type II (20.0%), Type I (18.0%), Type III (18.0%), Type I' (12.0%), and Type V (8.0%). Type II was slightly more common in male subjects (30.0%), followed by Type I (22.0%), Type I' (20.0%), Type III (16.0%), Type IV (8.0%), and Type V (8.0%). However, some differences between the sexes, with a tendency toward the predominance of Type IV in women and Type II in men, were not statistically significant, and there was no significant difference between the lip patterns by quadrants in women and men. (**International Journal of Biomedicine. 2023;13(3):143-147.**)

**Keywords:** lip prints • cheiloscopy • forensic dentistry

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### Introduction

The biological phenomenon of systems of furrows on the red part of human lips was first noted by anthropologists. R. Fischer was the first to describe it in 1902. Lip prints are unique, like fingerprints, for individuals. Apart from identifying and evidential use, lip prints may also be used in detection work, being the source of criminalistic information.<sup>(1)</sup> No lip-

print pattern is the same, even in identical twins.<sup>(2,3)</sup> Personal identification as an integral part of forensic science is an important and challenging task. Many methods are employed for identification. Lip grooves are a very good source for identification processes. This is a simple technique, a reliable, non-invasive, time-friendly mode that can be used successfully in human identification.<sup>(4-6)</sup> Braga et al.<sup>(7)</sup> concluded that no pair of lip-print patterns relate to each other. Domiaty et al.<sup>(2)</sup> showed that the lip-print pattern is unique for each individual, even in twins.

Saraswathi et al.<sup>(3)</sup> studied the lip prints of different individuals in different parts of the lips. Each pair of lips

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was divided into four compartments (quadrants), with two compartments on each lip, and were allotted the digits 1-4 in a clockwise sequence starting from the subject's upper right. In the overall study, no individual had a single type of lip print in all four compartments, and no two or more individuals had a similar type of lip-print pattern. It was found that an intersecting pattern was most common, both among males and females, having 39.5% and 36.5%, respectively. However, in the fourth quadrant, a branched pattern was common (24%).

The primary objective of the study by Remya et al.<sup>(8)</sup> was to determine the uniqueness of lip prints, to identify the most common type, and to determine the gender difference in the lip-print pattern. Lip prints collected were classified based on the classification scheme proposed by Suzuki and Tsuchihashi<sup>(9)</sup> into six types (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). The majority of the study population from Kerala State, India,<sup>(8)</sup> belonged to Type IV (26%) and Type I' (23.5%). Type V (7.5%) was the minor type. Type II (33%) was common in females, and Type II (38%) was common in males, with statistically significant differences ( $P < 0.001$ ). No two lip prints of the same type matched each other. The authors concluded that the lip print pattern of an individual is unique, and that there is a sex-related difference.

The purpose of this study was to analyze the lip prints among an adolescent sample of the Albanian population in Kosovo, to determine the most prevalent lip-print pattern in both genders, and to determine if there are any differences between male and female lip prints.

## Materials and Methods

A total of 100 adolescents aged from 12 to 18 were randomly selected from schools in southeastern Kosovo. All surveyed were healthy, without inflammation, deformities, surgical scars, or active lesions on the lips, and without hypersensitivity to cosmetic products. Materials for data collection included red color lipstick, cellophane tape, white paper A4, tissue paper to remove the lipstick, and scissors (Figure 1). Lip impressions were taken with red lipstick by Flor Mar. The lips were rubbed with tissue paper, and the lipstick was applied with cotton wool on the upper and lower lip. A piece of cellophane tape was positioned on the lips without pressure, and lip prints were taken with cellophane tape in the relaxed position of the lips. Each paper with a lip print was coded (Figure 2). For the analysis, the lips were divided into four quadrants: right upper quadrant (RUQ), left upper quadrant (LUQ), right lower quadrant (RLQ), and left lower quadrant (LLQ). The analysis was done using a magnifying glass. The lip prints were classified according to Suzuki and Tsuchihashi's classification.<sup>(11)</sup>

Statistical analysis was performed using the statistical software package SPSS version 23.0 (SPSS Inc, Armonk, NY: IBM Corp).

The study protocol was reviewed and approved by the Faculty of Dentistry Ethics Committee at Ss. Cyril and

Methodius University in Skopje (N #02-150115) and the Ethics Committee of the Dental Chamber of Kosovo, Republic of Kosovo (N #19). All participants provided written informed consent. All participants provided written informed consent.



Fig. 1. Technique for data collection.



Fig. 2. Lip print patterns.

## Results

In the present study, the slightly prevalent lip-print pattern among all subjects was Type II (25.0%), followed by Type I (20.0%), Type III (17.0%), Type IV (16.0%), Type I' (16.0%), and Type V (6.0%). The lip prints of Type IV were slightly more common in female subjects (24.0%), followed by Type II (20.0%), Type I (18.0%), Type III (18.0%), Type I' (12.0%), and Type V (8.0%). Type II was slightly more common in male subjects (30.0%), followed by Type I (22.0%), Type I' (20.0%), Type III (16.0%), Type IV (8.0%), and Type V (8.0%). There was no significant difference in the lip patterns between male and female subjects (Fisher's exact test = 6.864,  $P = 0.233$  / Monte Carlo Sig. (2-sided) / 0.222 – 0.244 /) (Table 1).

**Table 1.**

**Patterns of lip prints in female and male subjects.**

Gender	Lip prints						Total	
	Type I	Type I'	Type II	Type III	Type IV	Type V		
Female	n	9	6	10	9	12	4	50
	%	18.0%	12.0%	20.0%	18.0%	24.0%	8.0%	100%
Male	n	11	10	15	8	4	2	50
	%	22.0%	20.0%	30.0%	16.0%	8.0%	4.0%	100%
Total	n	20	16	25	17	16	6	100
	%	20.0%	16.0%	25.0%	17.0%	16.0%	6.0%	100%

The lip pattern in female subjects (Table 2) in four different lip quadrants was as follows: In RUQ, Type IV was slightly more common (28.0%), followed by Type II (20.0%), Type III (18.0%), Type I (14.0%), and Type I' (14.0%), and Type V was the rarest (8.0%). In LUQ, Type IV was slightly more common (24.0%), followed by Type II (20.0%), Type III (20.0%), Type I (14.0%), Type V (12.0%), and Type I' was the rarest (10.0%). In LLQ, Type I was slightly more common (24.0%), followed by Type II (24.0%), Type IV (22.0%), Type III (12.0%), Type I' (10.0%), and Type V was the rarest (8.0%). In RLQ, Type II was slightly more common (28.0%), followed by Type IV (22.0%), Type III (16.0%), Type I' (14.0%), Type I (12.0%), and Type V (8.0%) was the rarest. There was no significant difference between lip-print patterns by quadrants in female subjects (Fisher's exact test = 6.387,  $P=0.979$ ) / Monte Carlo Sig. (2-sided) / 0.976 – 0.983 /).

**Table 2.**

**Patterns of lip prints in female subjects.**

Lip print	Quadrants				Total	
	RUQ	LUQ	LLQ	RLQ		
Type I	n	7	7	12	6	32
	%	14.0%	14.0%	24.0%	12.0%	16.0%
Type I'	n	7	5	5	7	24
	%	14.0%	10.0%	10.0%	14.0%	12.0%
Type II	n	10	10	12	14	46
	%	20.0%	20.0%	24.0%	28.0%	23.0%
Type III	n	8	10	6	8	32
	%	16.0%	20.0%	12.0%	16.0%	16.0%
Type IV	n	14	12	11	11	48
	%	28.0%	24.0%	22.0%	22.0%	24.0%
Type V	n	4	6	4	4	18
	%	8.0%	12.0%	8.0%	8.0%	9.0%
Total	n	50	50	50	50	200
	%	100.0%	100.0%	100.0%	100.0%	100.0%

The lip patterns in male subjects (Table 3) in four different lip quadrants was somewhat different than those in

female subjects. In RUQ, Type I' was slightly more common (24.0%), followed by Type I (22.0%), Type II (18.0%), Type III (18.0%), Type IV (12, 0%), and Type V was the rarest (6.0%). In LUQ, Type II was slightly more common (22.0%), followed by Type I (18.0%), Type I' (18.0%), Type III (18.0%), Type IV (18.0%), and Type V was the rarest (6.0%). In LLQ, Type II was also slightly more common (28.0%), followed by Type I (20.0%), Type I' (20.0%), Type III (16.0%), Type IV (10,0%), and Type V was the rarest (6,0%). In RLQ, Type II was also slightly more common (32,0%), followed by Type I (24,0%), Type III (18,0%), Type I' (14,0%), Type IV (8,0%), and Type V was the rarest (4,0%). There was no significant difference between lip-print patterns by quadrants in male subjects (Fisher's exact test = 6.970,  $P=0.967$  / Monte Carlo Sig. (2-sided) / 0.962 – 0.971 /).

**Table 3.**

**Patterns of lip prints in male subjects**

Lip print	Quadrants				Total	
	RUQ	LUQ	LLQ	RLQ		
Type I	n	11	9	10	12	42
	%	22.0%	18.0%	20.0%	24.0%	21.0%
Type I'	n	12	9	10	7	38
	%	24.0%	18.0%	20.0%	14.0%	19.0%
Type II	n	9	11	14	16	50
	%	18.0%	22.0%	28.0%	32.0%	25.0%
Type III	n	9	9	8	9	35
	%	18.0%	18.0%	16.0%	18.0%	17.5%
Type IV	n	6	9	5	4	24
	%	28.0%	24.0%	22.0%	22.0%	24.0%
Type V	n	3	3	3	2	11
	%	6.0%	6.0%	6.0%	4.0%	5.5%
Total	n	50	50	50	50	200
	%	100.0%	100.0%	100.0%	100.0%	100.0%

## Discussion

In the present study, the slightly prevalent lip-print pattern among all subjects was Type II (25.0%), followed by Type I (20.0%), Type III (17.0%), Type IV (16.0%), Type I' (16.0%), and Type V (6.0%).

Various studies have shown different predominant lip patterns among the population. The most prevalent lip-print pattern in the Iranian population, according to a study conducted by Moshfeghi et al.,<sup>(10)</sup> was Type V (33.16%), and less prevalent was Type III (2.60%). In contrast to this result, Manikyaa et al.<sup>(11)</sup> noted that in Kerala and Manipuri populations Type III was the most prevalent (45% and 38%, respectively). According Šimović et al.,<sup>(12)</sup> in the Croatian population, Type II (40.0%) was predominant in females, while in males, the predominant pattern was Type III (35.0%). Haroun et al.,<sup>(13)</sup> in a sample of the Sudanese population, found that the prevalent



lip print pattern was Type I'. In the North Indian population, Type I (32.33%) appears to be the most predominant lip pattern, according to a study conducted by Randhawa et al.<sup>(14)</sup>

The most common type among Pondicherry males was Type III, whereas, in females, it was Type II, according to a study conducted by Kumar et al.<sup>(15)</sup>. Negi et al.<sup>(16)</sup> found that in the North Indian population, the branched pattern (Type II) in males and the vertical pattern (Type I) in females were the predominant lip print patterns.

In a study by Malik et al.,<sup>(17)</sup> performed on the Indian population, Types I and I' were most common in females, but Types IV and V were seen most commonly in males. Around 48 of 50 females and 45 of 50 males were correctly recognized based on lip prints. The authors concluded that lip prints can be used to determine gender. A study by Sharma et al.<sup>(18)</sup> aimed to ascertain whether lip prints hold the potential to determine the sex of an individual from the configuration. The study included 40 students of Subharati Dental College, 20 males and 20 females, aged between 20 and 30 years. The results obtained showed no two lip prints matched with each other, Type I (I') was most seen in females, whereas Type IV was seen most in males. According to that study, 18 of 20 females were correctly recognized as females, and 17 of 20 males were correctly identified as males, based on their lip prints. Thus, the authors concluded that lip prints are unique to an individual and hold the potential for recognizing the sex of an individual. A study by Nagalaxmi et al.<sup>(19)</sup> showed the uniqueness of the lip prints and rugae patterns, with the lip prints showing a sensitivity of 81.7% in predicting sex. A study by Tandon et al.<sup>(20)</sup> also showed that lip prints can aid in gender determination.

In contrast, Sandhu et al.<sup>(21)</sup> showed that among the Punjabi population, Type I pattern was found to be predominant in both males (51.02%) and females (43.47%), and there was no statistically observed difference between males and females in individual lip-print types. These data are consistent with our results regarding no difference between males and females in the character of lip prints.

A study conducted at Kasturba Medical College (Mangalore, India)<sup>(22)</sup> among 200 (100 North Indians and 100 South Indians) randomly selected medical students between 18-25 years showed that Type II was the most commonly occurring lip-print pattern and Type V was the rarest. In addition, Type I and Type I' lip patterns were more common in males, and Type II, followed by Type III, Type IV, and Type V patterns were more common in females. At the same time, the revealed differences were typical for LUQ. Type III and Type IV patterns were predominant in North Indians, while Type II was predominant in South Indians. Results of the study showed that lip prints were related to sex and geographical distribution of the individual.

A study by Ghimire et al.<sup>(23)</sup> included a total of 200 Nepalese undergraduate students. Type I pattern was predominant in all four quadrants among males. In females also Type I was predominant in LUQ, LLQ and RLQ, whereas in RUQ, Type II pattern was predominant.

The quadrant-wise predominant lip-print patterns among male and female Indian and Malaysian dental students were

assessed in a study by Durbakula et al.<sup>(24)</sup> The dominant lip pattern in all four quadrants for Indians was Type II, and for Malaysians, it was Type I'; the differences were statistically significant ( $P < 0.05$ ).

Among the Goan population,<sup>(25)</sup> the predominant pattern in all four quadrants was Type V followed by Type I' in RUQ, LUQ, and LLQ and Type I in RLQ. The distribution of patterns was not affected by sex. Thus, it is possible to note the ethnic features in the distribution of lip patterns; concerning gender differences, the existing data are contradictory.

In the present study, the most common lip pattern among subjects was Type II. However, some differences between the sexes, with a tendency toward the predominance of Type IV in women and Type II in men, were not statistically significant, and there was no significant difference between the lip patterns by quadrants in women and men.

## Competing Interests

The authors declare that they have no competing interests.

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