

Cheiloscopy: An Aid in Gender Identification

Bajracharya D¹, Mainali A², Vaidya A³, Thapa S⁴, Pandey S⁵

¹Lecturer, Department of Oral Pathology, Microbiology & Forensic Odontology, ²Lecturer, Department of Oral Medicine and Radiology, ^{3,4}Dental surgeon, ⁵Intern, Department of Oral Pathology, Microbiology & Forensic Odontology, ^{1,2,3,4,5}Kantipur Dental College, Teaching Hospital and Research Center.

Abstract

Back ground

Forensic odontology plays pivotal role in identification of human remains. Cheiloscopy, the study of lip prints, acts as a valuable tool in the identification of an individual as well in gender differentiation.

Aims and objectives

The aim of this study is to establish the use of lip pattern in gender determination in forensic science.

Materials and Method

The study included 180 subjects, comprising 90 male and 90 female. Lip print pattern was determined by using classification proposed by Suzuki and Tsuchihashi. Kappa test was applied to check for the intra observer variation. The association of gender with the lip print pattern was tested using Chi-square test.

Results

The study showed that Type 1 was found to be most common lip pattern followed by Type 2 whereas Type 5 was the least common. In males Type 2 was the most common pattern found while Type 1 was common in females. There was statistically significant difference in the lip print patterns between gender groups.

Conclusion

The study showed difference in the lip print pattern among the gender groups which can be further used effectively in identification of crime suspects in forensic investigations.

Key words:

Cheiloscopy, gender, identification.

Correspondence: Dr. Dipshikha Bajracharya, MDS, Department of Oral Pathology, Microbiology and Forensic odontology, Kantipur Dental College Teaching Hospital and Research center,
Email: drdipshikhabaj@gmail.com

Introduction

Identification of an individual plays prime role in any forensic investigation. Fingerprints, dental records and DNA comparisons are some of the techniques which are used commonly. However there may be certain situations where other supplemental aids like lip prints analysis become essential.¹

Lip prints are the normal lines and furrows in the form of wrinkles and grooves. These are present in the zone of transition between the inner labial mucosa and outer skin.

Study of these lip prints are known as Cheiloscropy.² Lip prints are unique to an individual and they do not change throughout the life time.³ This biological phenomenon was first noted and described by R. Fischer in 1902.⁴ The vermilion border of the lips has minor salivary and sebaceous glands which, together with themoisturising done by saliva leads to the possibility of the formation of latent lip prints.⁵ Lip prints left on the crime scene can be analyzed and compared with the suspected individual thus providing an important identification aid in forensic science.¹

The purpose of present study was to establish the use of lip pattern in gender identification in forensic investigations.

Materials and method

The study was carried out in the Department of Oral and Maxillofacial pathology in Kantipur Dental College, Teaching hospital and Research center. The study period was from January 2013 to Jun 2013. Our study sample comprised of 90 male and 90 female subjects, aged from 16 to 29 years. The study was conducted after obtaining informed verbal consent from the subjects. For the analysis of lip prints, the materials used were dark red colored lipstick, lipstick applicator, cellophane tape, white bond paper and magnifying glass. Only subjects with full complement of teeth were included. The individuals who were hypersensitive to cosmetics or presented with any pathology like ulcer or trauma of the lips were excluded.

For recording the lip prints, lips were initially wiped using tissue paper following which lipstick was applied gently using a lipstick applicator from the central to the lateral portion of the upper

lip. The subjects were then asked to clutch both the lips in order to make sure that the lipstick application was uniform. After 2 minutes, the glue portion of the cellophane tape was used to obtain the impression of the lip. This record was immediately transferred on to a white bond paper by gently sticking the cellophane tape. For analysis, only the central portion of the lower lip (10mm wide) was considered as proposed by Sivapathasundharam et al.⁶ This area was taken as it is always visible in any fragment and based on the numerical superiority of the lines in the area of study.⁷

The classification proposed by Suzuki and Tsuchihashi was used to further classify the lip patterns as follows (Fig.1):⁸ Type 1 vertical grooves that run across the entire lip; type 1 vertical grooves that did not extend the entire lip surface; type 2 grooves with branches; type 3 presented with intersected grooves; type 4 presented with reticular grooves and type 5 includes grooves that cannot be determined morphologically as any other type.

Identification of lip pattern was done by two observers. Kappa test was applied to check for the intra observer variation. The measure of agreement between the two observers was 98 %. Statistical analysis was done using SPSS 17.0 software. The association of gender with the lip print pattern was tested using Chi -square test. The *p* values were calculated under the predetermined level of significance of 0.05 and at the confidence level of 95%.

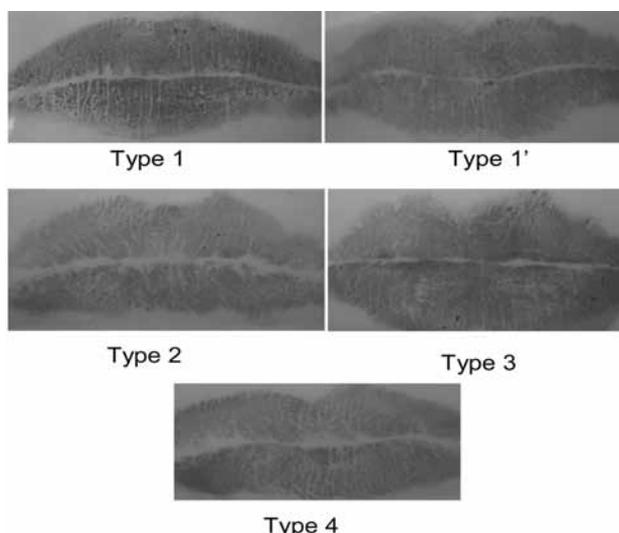


Fig. 1- Lip print (Classification proposed by Suzuki and Tsuchihashi)

Results

Total of 180 subjects, comprising of 90 male and 90 female were included in the study. The lip prints obtained was identified using the classification proposed by Suzuki and Tsuchihashi.

Table 1 gives the age distribution of the subjects which ranged from 16-29 yrs with the mean of 21.10 years and standard deviation of 2.71. In our study, type 1 was found to be most common lip pattern constituting 26.7% followed by type 2 which was 24.4%, type 1' was 15.6%, type 3 and type 4 constituting 15% and the least common was type 5 comprising of 3.3%(Table 2).

In our study, type 2 (33.3%) was most common lip pattern comprising among the males followed by type 4 (21.1%), type 3 and type 1(15.6%), followed type 1' (8.9%) and type 5(5.6%) respectively (Fig. 2). Type 1 (37.8%) was common in females, followed by type 1' (22.2%), type 2 (15.6%), type 3(14.4%), type 4 (8.9%) and type 5(1.1%) respectively (Fig. 3). There was a significant association between the gender and the lip print patterns ($p=0.00$) (Table 3).

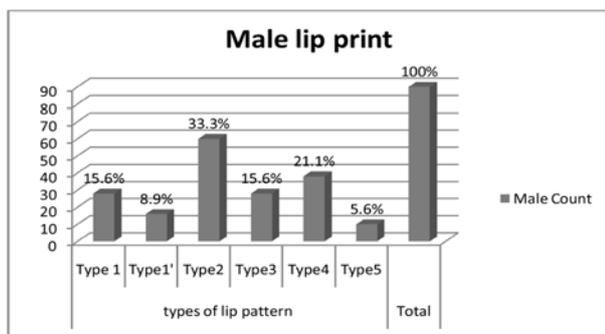


Fig. 2- Distribution of lip print pattern in Male

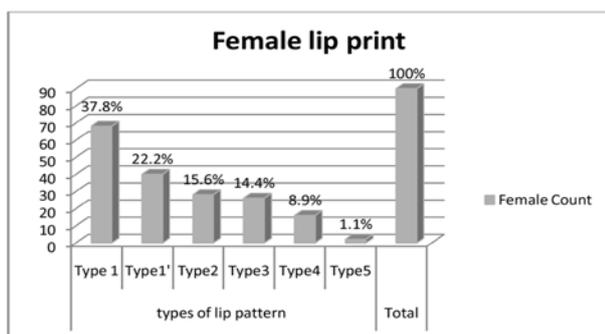


Fig.3- Distribution of lip print pattern in Female

Table 1- Age distribution

Gender	N	Range	Mean	SD
Male	90	16-29	21.10	2.71
Female	90			

Table 2- Percentage distribution of lip print pattern

Observer	Total	Type	Frequency	Percentage (%)
1	180	1	48	26.7
		1'	28	15.6
		2	43	24.4
		3	28	15.0
		4	27	15.0
		5	6	3.3
2	180	1	48	
		1'	28	
		2	45	
		3	26	
		4	27	
		5	6	

Table 3- Association of Gender with Lip pattern

Gender	Total	Chi-sq	p-value
Male	90	52.95	0.00*
Female	90		

*Statistically significant (P value <0.05)

Confidence Interval 95%

Discussion

Forensic odontology plays important role in identification of human remains. The lip prints which are left on the crime scene can act as a valuable tool in the identification of the suspects. Lip prints are left on the crime scene when it comes to contact with various surfaces. Aggrawal in his investigation has proved that lip prints are equally effective in criminal identification as finger prints. Therefore lip prints can also be used as an adjunct if no traditional methods of identification are accessible.

In our study we found that no two lip print patterns matched the other. In the present study

type 1 was the most common pattern, followed by type 2 in the population which was similar to findings by Vahanwalla and Parekh¹⁰. Type 2 was found to be the most common lip print in male population followed by type 4, type 3, type 1, type 1' and type 5 which was in contrast to the findings by Sathish Kumar et al in Pondicherry, Indian Population and by Vahanwalla and Parekh in which they have concluded type 3 to be the most common lip print in males.^{11,10} In females, Type 1 and 1' were most common lip pattern followed by type 2, type 3, type 4 and type 5 which was similar to study done by Preethi et al and Singh J et al.^{7,12}

The present study showed statistically significant difference in the lip pattern among the male and female subjects (p=0.00) which was similar to findings by Preethi et al.⁷ and Sathish Kumar et al.¹¹ These findings show the uniqueness of lip pattern among the genders thus marking the use of cheiloscropy in gender identification in forensic odontology.

Conclusion

Cheiloscropy in forensic science helps in identification of gender, which further helps in identifying the criminal suspects. Though the use of cheiloscropy in routine forensic investigation is still in question, in near future it may be used in par with standard methods like finger prints.

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