

Variability of Lip Print Pattern in Relation to Gender Among Two Ethnic Groups of Haryana

PRABHJOT KAUR, HARSH, RASALIKA, SUBHASH KAUSHAL, ASHISH SHARMA

ABSTRACT

Introduction: Lip prints don't change during the life of a person and are unique. Lip prints are the characteristic patterns of the fissures (*sulci labiorum*) in the form of elevations and depressions on the labial mucosa and characterises the human being the same as finger prints. Variations in lip print patterns could help in sex determination.

Aim: The present study was initiated with the aim to develop a baseline data for cheiloscopy, to investigate the variability of lip prints in relation to gender in two different ethnic groups of Haryana and also establishes the usefulness of lip print patterns in identification of a person.

Materials and Methods: The study consisted of 40 families belonging to Haryanvi Baniyas and 40 families belonging to Haryanvi Jats. Out of the total subjects studied, 88 males and 76 females belonged to Haryanvi Baniyas and 84 males and 81 females were from Haryanvi Jats. Study material used were transparent cellophane tape glued on one side (24 mm), Black powder (computer printer powder

of Oddyessy), White paper, Digital camera (Sony, 12 mega pixels), Magnifying lens. The lip prints were analysed by using Adobe Photoshop@7.0 software after dividing each lip print into 8 compartments.

Results: Lip print analysis showed that the most predominant lip pattern in the entire study population was type IV was found to be maximum. However, separately in each endogamous group, incidence of type IV was found to be maximum in population of Haryanvi Baniyas whereas, in Haryanvi Jats, the incidence of lip prints was maximum of type II. Lip print pattern in upper lip in haryanvi baniyas is type IV in males, type II in females and in lower lip is type IV both in males and females. In case of harayanvi jats in upper lip it is type II in both males and females while in lower lip it is type IV in males and type II in females.

Conclusion: The lip print patterns are similar to some extent between males and females of the same ethnic group but varied between different ethnic groups. They serve supplementary tool for identification of an individual along with other modes to recognize the sex of an individual.

Keywords: Cheiloscopy, Mucosa, Vermilion border

INTRODUCTION

Lips surround the oral orifice and are lined externally by skin and internally by mucosa. There is a reddish zone where the skin is continuous with the mucosa known as transitional or vermilion border, which is lined by the thin keratinised epithelium [1]. Each human being is distinct as exhibit their own pattern of characteristics [2,3]. Lip print pattern is an anatomical character of the human lips [4]. The lip print patterns can be identified as early as the sixth week of the intrauterine life [5]. Lip prints are unique to an individual and behold the potential for recognition of the sex of an individual [6].

Cheiloscopy is derived from Greek words 'cheilos' meaning 'lips' and 'skopein' meaning 'to see' [7]. One of the most interesting emerging method of human identification which originates from the criminal and forensic practice, is human

lips recognition [8]. To avoid post mortem alterations, Lip prints should be obtained within 24 hours of time of death [9]. It has been found that lip print can be sufficiently used by the measurements of biometric systems [10].

The present study was initiated with the aim to develop a baseline data for cheiloscopy, to investigate the variability of lip prints in relation to gender in two different ethnic groups of Haryana and also establishes the usefulness of lip print patterns in identification of a person.

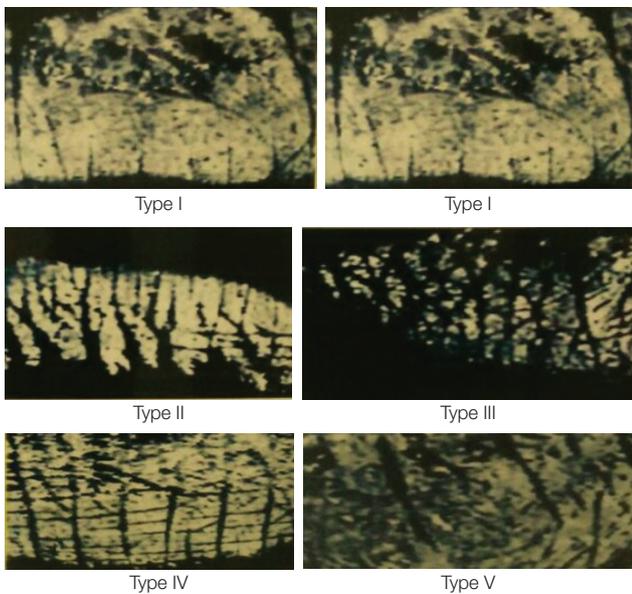
MATERIALS AND METHODS

The present study is based on familial patterns of lip prints in Jats and Baniyas of Haryana. Study was conducted in Department of Anatomy (2010- 2013) of MMIMSR, Mullana, Ambala which includes lip prints of Jats and Baniyas of Haryana which included 40 Haryanvi Jat families and 40

Haryanvi Baniya families residing in Haryana for the past 10 or more years. The subjects were selected by an interview and prior informed consent for this study was obtained from subjects in writing, both in English and vernacular. Study was approved by ethical committee of the institution (MMIMSR, Mullana, Ambala). Families with at least four or more members (father, mother and two siblings) and gave consent for the study were included in the study. Subjects with inflammation, trauma, congenital abnormalities (cleft lip and cleft palate) and surgical scars and other abnormalities of the lip were not included in the study.

Method of Collection of Lip Prints [Table/Fig-1]:

On both the upper and lower lips, glued portion of the cellophane tape was applied on both the lips, and held in place, applying pressure for a few seconds. Then the tape was lifted from one end to the other. The black powder (printer powder of Oddyessy make) was sprinkled on the lip print to highlight the print. The strip of cellophane was glued to a piece of white paper and subsequently photographs of the lip prints were taken. The data was recorded as given in proforma and it was analysed using Adobe Photoshop @ 7.0 software.



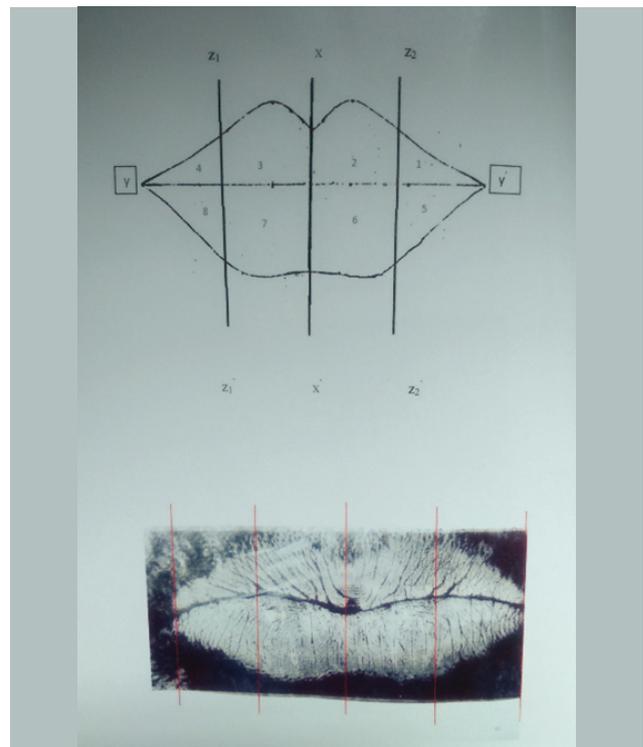
[Table/Fig-1]: Collection of lip prints pattern.

Division of Lip Prints

Lip prints were divided into a total of 8 areas named as under [Table/Fig-2]:

Left upper lateral, left upper medial, right upper medial, right upper lateral, left lower lateral, left lower medial, right lower medial, right lower lateral.

By noting the classified types of grooves, the individual's lip pattern was recorded.



[Table/Fig-2]: Lip prints were divided into a total of 8 quadrants.

The Lip Prints were categorized according to classification given by Suzuki and Tsuchihashi [Table/Fig-3] [11].

TYPE I : Lip having full vertical grooves

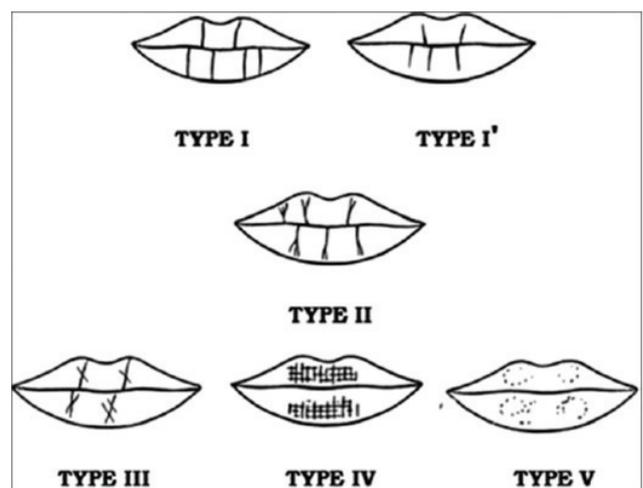
TYPE I' : Lip having partial vertical grooves

TYPE II : Branched grooves

TYPE III: Intersected (diamond) grooves

TYPE IV: Reticular (rectangular) pattern

TYPE V: Other patterns (undetermined)



[Table/Fig-3]: Classification given by Suzuki and Tsuchihashi [11].

RESULTS

The present study was modelled upon the classification of lip prints given by Suzuki and Tsuchihashi. In the overall population studied, lip print pattern type IV (reticular) was found to be maximum.

When seen separately in each endogamous group, incidence of type IV was found to be maximum (35.59%) in population of Haryanvi Baniyas whereas in Haryanvi Jats, the incidence of lip prints was maximum (41.36%) of type II (branched).

Lip print pattern in upper lip in haryanavi baniyas is type IV in males (35.7%) , type II in females (33.2%) and in lower lip is type IV both in males (36.9%) and females (36.1%). In case of harayanavi jats in upper lip it is type II in both males (44.9%) and females (46.9%) while in lower lip it is type IV in males (36.9%) and type II in females (41.3%).

In the present study, the incidence of pattern of lip prints is different in these endogamous groups. In Haryanvi baniyas, the most common lip print pattern found to be type IV (35.59%). This was followed by type II (29.4%), type III (22.6%), type V (5.5%), type I (5.5%) and type I' (1.3%). In Haryanvi Jats, type II (41.3%) was observed as the most predominant lip print pattern which was followed by type IV (38.4%), type III (10.6%), type I (6.3%), type V (2.5%) and type I' (0.6%).

The present study describes the distribution of lip print patterns in upper and lower lips of Haryanvi endogamous groups. There is a difference in prevalence of lip print patterns in upper lip of males (type IV-35.7%) and females (type II-33.2%) and in lower lip, prevalence of lip print pattern (Type IV) is similar in males (36.9%) and females (36.1%) of Haryanvi Baniyas.

In Haryanvi Jats, prevalence of lip print pattern (type II) in upper lip was almost similar in males (44.9%) and females (46.9%) but there is a difference in prevalence of lip print pattern in lower lip of males (type IV- 36.9%) and females (Type II- 41.3%).

DISCUSSION

The possibilities to use the red part of lips, to identify a human being are wider than it is commonly thought. Lip print patterns appear to be genotypically determined [12]. Lip print patterns are permanent like that of finger prints [13]. Cheiloscopy has been a subject of great interest as it is least invasive and easily available mode for study purpose [14].

This study was conducted using the classification of Tsuchihashi et al., who proposed a standard classification of their own for different types of lip prints [15].

1. Predominant Lip Print Pattern in Different Regions [Table/Fig-4]

In India, various studies have shown that a particular population will show predominance of a particular lip print type. This is a

potentially useful tool for identification [16].

In the present study, the most predominant pattern in the entire study population, taking both the upper and lower lips together was Type IV which constituted 37% of all the patterns. This was followed in order by Type II (35.4%), Type III (16.6%), Type I (6%), Type V (4.06%) and Type I' (0.9%).

Our results are in concordance with Verghese et al., [17] who found that type IV was the most frequently observed in both the sexes and in both the quadrants in the population of Kerala.

Verghese et al., [18] observed that type IV (reticular) was predominant in the subjects (people of Karantaka) chosen for the study. This was followed by type III, type II, type I', type I and type V.

In contrast to our study, Saraswathi TR et al., [19] found that the Type III (intersected) was the most predominant pattern among all the lip compartments of the study subjects, both among males (39.5%) and females (36.5%). It was observed in the residents of Kanpur, U.P . In this study, the subjects selected were from general population, not from any particular endogamous or ethnic group.

Our results differed from those obtained by Augustine, Barpande and Tupkari [20] who found that Type III to be the most common, followed in order by type II, type IV , type I, type I' and type V. In this study, the subjects employed included individuals from rural and urban localities of Aurangabad, Maharashtra without any specific race.

Sandhu et al., [21] in their study of lip print pattern in a Punjabi population found type I pattern to be predominant in both males and females, without any specific endogamous group.

The occurrence of patterns shows that some patterns are common to all the populations. However, the occurrence of patterns in higher percentages in one population and very low in others is perhaps due to the reason that these patterns are the unique characteristics of any population.

S. no.	Author	Region	Predominant lip pattern
1.	Augustine et al., [20]	Maharashtra	Type III
2.	Saraswathi TR et al., [19]	Tamilnadu	Type III
3.	Verghese AJ et al., [17]	Kerala	Type IV
4.	Verghese AJ et al., [18]	Karnataka	Type IV
5.	Sandhu et al., [21]	Punjab	Type I
6.	Present study	Haryana	Type IV

[Table/Fig-4]: Predominant lip print pattern in different regions.

2. Predominant Lip Print Pattern in Different Endogamous Groups [Table/Fig-5]

From these observations, it can be suggested that the racial

S.no	Author	Endogamous group	Predominant lip print pattern
1.	Vats et al., [22] (Delhi and Haryana)	Brahmins	Type Y
		Jats	Type III
		Scheduled Castes	Type III
2.	Present study (Haryana)	Baniyas	Type IV
		Jats	Type II

[Table/Fig-5]: Predominant lip print pattern in different endogamous groups.

differences may be one of the factors for determining lip prints.

Vats et al., [22] modified classification given by given by Suzuki and Tsuchihashi. They typed those lip prints into Y type in which two or more blends were found and In Brahmins, type Y was most prevalent and in Jats and Scheduled caste population, type III was most prevalent. This study differs from present study. Vats et al., calculated the type of pattern in all groups and regions combined whereas our study is extensive and based on 8 areas belonging to well defined two endogamous groups of same region.

3. Prevalence of Lip Print Pattern in Upper and Lower Lips of Males and Females [Table/Fig-6]

Augustine et al., [23] observed that the upper lip of both males and females showed type III to be the most predominant pattern in both the upper and lower lips. The reason for this difference can be different environmental factors and regional variations. Patterns are similar to some extent between males and females of the same ethnic group but varied between different ethnic groups.

S.no.	Author	Population	Upper lip		Lower lip	
			Males	Females	Males	Females
1	Augustine et al., [23]	General	III	III	III	III
2	Present study	Haryanvi Baniyas	IV	II	IV	IV
		Haryanvi Jats	II	II	IV	II

[Table/Fig-6]: Prevalence of lip print pattern in upper and lower lips of males and females.

CONCLUSION

From present study we developed baseline data for cheiloscopy with respect to region and ethnicity which is helpful in identification of a person, however subjects with inflammation, trauma, congenital abnormalities (cleft lip and cleft palate) and surgical scars and other abnormalities of the lip will be excluded because of their unsuitability for this study. In the present study, the most predominant lip pattern in the entire study population was type IV (37%) was found to be

maximum. However, separately in each endogamous group, incidence of type IV was found to be maximum in population of Haryanvi Baniyas whereas, in Haryanvi Jats, the incidence of lip prints was maximum of type II. Lip print pattern in upper lip in haryanvi baniyas is type IV in males, type II in females and in lower lip is type IV both in males and females. In case of harayanvi jats in upper lip it is type II in both males and females while in lower lip it is type IV in males and type II in females.

The occurrence of lip prints is so variable that no factor (race, region, gender, inheritance) can be associated for the presence of any type of lip print. Factors make the lip prints unique for that particular individual which is a very important factor for identification of that individual. India is a vast country with large ethnic variation. Because of diversity in India, lip print patterns can be affected by all these differences like environmental, regional, ethnic, etc. The future prospective of this study is that lip print pattern should be studied in depth with large number of samples in different ethnic groups of various regions to establish further facts and truths.

REFERENCES

- [1] Lawrence H. Alimentary system. In: Williams P, Dyson M, Dussek J, Bannister LH, Berry MM, Collins P(editors) Gray's Anatomy, 38th edition. London: ELBS;1995.1687-88.
- [2] Tsuchihashi Y. Studies on personal identification by means of lip prints. *Forensic Sci.* 1974;3(3):233-48.
- [3] Suzuki K, Tsuchihashi Y and Suzuki H.A trial of personal identification by means of lip print I. *Jap J Leg Med.* 1968;22:392.
- [4] Caldas IM, Magalhães T, Afonso A. Establishing identity using cheiloscopy and palatoscopy. *Forensic Sci Int.* 2007;165(1):01-09.
- [5] Sivapathasundharam B, Ajay Prakash P, Sivakumar G. Lip prints (Cheiloscopy). *Indian J Dent Res.* 2001;12(4):234-37.
- [6] Sharma P, Saxena S, Rathod V. Cheiloscopy: the study of lip prints in sex identification. *J Forensic Dent Sci.* 2010;1:24-27.
- [7] Hirth L, Gottsche H, Goedde HW. Lip prints – variability and genetics(author's translation). *Humangenetik.* 1975;30(1):47-62.
- [8] Vahanwala SP, Parekh BK. Study of lip prints as an aid to forensic methodology. *J Forensic Med Toxicol.* 2000;17:12-18.
- [9] Gupta S, Gupta K, Gupta OP. A study of morphological patterns of lip prints in relation to gender of North Indian population. *Journal of Oral Biology and Craniofacial Research.* 2011;1(1):12-16.
- [10] Choras M. Human Lips Recognition. In M. Kurzyński, P Edward, M Wozniak (Eds): Computer recognition systems 2, advances in soft computing. *Springer.* 2007;45:838-43.
- [11] Suzuki K, Tsuchihashi Y. Personal Identification by Means of Lip PRINTS *Journal of Forensic Medicine.* 1970;17(2):52-57.
- [12] Utsuno H, Kanoh T, Tadokoro O, Inoue K, Preliminary study of postmortem identification using lip prints, *Forensic Sci. Int.* 2005;(149):129-32.
- [13] Kim JO. Lip print recognition for security systems by multi-resolution architecture. *Future Generation Computer Systems.* 2004;20:295-301.
- [14] Renaud M. Lip prints identification in Legal Medicine (Review of French doctoral dissertation) NOUV Presse Med.

- 1973;2:2617-20 cited in Shaw J H Textbook on oral biology. Philadelphia:Saunders;1978.ch 34.
- [15] Gopichand V.V.P., Kaushal S, Kaur G. Personal identification using lip printd (cheiloscopy)- A study in 500 Punjabi females. *Journal Indo-Pacific Academy of Forensic Odontology*. 2010;1(2):20-22.
- [16] Shafer, Hine, Levy. Shafer's Textbook of Oral Pathology. 6th ed. Elsevier;2009.896.
- [17] Venkatesh R, David MP. Cheiloscopy : An aid for personal identification. *J Forensic Dent Sci*. 2011;3(2):67-70.
- [18] Verghese A J, Mestri S C. A study of efficacy of lip prints as an identification tool among the people of Karantaka in India. *J Indian Acad Forensic Med*. 2011;33(3):200-02.
- [19] Saraswathi TR, Mishra G, Ranganathan K. Study of lip prints. *J Forensic Dent Sci*. 2009;1(1):28-31.
- [20] Augustine J, Baroande SR, Tupkari JV. Cheiloscopy as an adjunct to Forensic Identification: A study of 600 individuals. *J Forensic Odontostomatol*. 2008;27(2):44-52.
- [21] Sandhu SV, Bansal H, Monga P, Bhandari R. Study of lip print pattern in a Punjabi population. *J Forensic Dent Sci*. 2012;4(1):24-28.
- [22] Vats Y, Dhall KS, Kapoor KA. Heritability of lip print patterns among North Indian Populations. *J Forensic Res*. 2011;2(7):137.
- [23] Augustine J, Baroande SR, Tupkari JV. Cheiloscopy as an adjunct to Forensic Identification: A study of 600 individuals. *J Forensic Odontostomatol*. 2008;27(2):44-52.

AUTHOR(S):

1. Dr. Prabhjot Kaur
2. Dr. Harsh
3. Dr. Rasalika
4. Dr. Subhash Kaushal
5. Dr. Ashsish Sharma

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Anatomy, MMMC&H, Solan, MMIMSR, Mullana, Ambala (Haryana), India.
2. Assistant Professor, Department of Anatomy, MMMC&H, Solan, MMIMSR, Mullana, Ambala (Haryana), India.
3. Demonstrator, Department of Anatomy, Gian Sagar Medical College and Hospital, Banaur, Rajpura, MMIMSR, Mullana, Ambala (Haryana), India.

4. Professor, Department of Anatomy, GMC Patiala, MMIMSR, Mullana, Ambala (Haryana), India.
5. Senior Resident, Department of Surgery, GMC Patiala, MMIMSR, Mullana, Ambala (Haryana), India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Prabhjot Kaur,
C – 16, Dev Bhoomi Apartments, Green Valley, Deonghat,
Solan, H.P.(173212), India.
E-mail: docprabh26@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS:

None.

Date of Publishing: Jul 01, 2016