

Correlation of Lip Prints with Gender, ABO Blood Groups and Intercommissural Distance

Pradhuman Verma, Suresh K Sachdeva, Kanika Gupta Verma¹, Swati Saharan, Kompal Sachdeva²

Departments of Oral Medicine and Radiology, ¹Pedodontics and Preventive Dentistry, ²Conservative Dentistry, Surendra Dental College and Research Institute, Sri Ganganagar, Rajasthan, India

Abstract

Background: In forensics, the mouth allows for a myriad of possibilities. Lip print on glass or cigarette butt found at crime scenes may link to a suspect. Hence, a dentist has to actively play his role in personal identification and criminal investigation. **Aims:** To investigate the uniqueness of the lip print patterns in relation to gender, ABO blood groups and intercommissural distance (ICD). **Materials and Methods:** The study was conducted on 208 randomly selected students. The lip print of each subject was obtained and pattern was analyzed according to Tsuchihashi classification. The blood group and ICD at rest position was recorded for each. **Results:** The study showed that Type II (branched) lip pattern to be most prominent. The B+ blood group was the most common in both genders and the ICD is higher in males. The lip print pattern does not show any correlation between ABO blood groups, gender, and ICD. **Conclusions:** The lip print pattern shows no correlation with gender, ABO blood groups, or ICD. Further studies with larger samples are required to obtain statistical significance of this correlation.

Keywords: Blood groups, Competent lips, Intercommissural distance, Lip prints

Address for correspondence: Dr. Pradhuman Verma, Department of Oral Medicine and Radiology, Surendra Dental College and Research Institute, H.H Gardens, Power House Road, Sriganaganagar - 335 001, Rajasthan, India. E-mail: praddy_verma@yahoo.co.in

Introduction

Individual identification is an important and challenging task in forensic investigation, which was based on scientific principles. The first study on the lip print was carried out in Hungary in 1961. Tsuchihashi^[1] and Suzuki^[2] established that the arrangement of lines on the red part of the human lip is individual and unique. The grooves were named as Sulci Labiorum and corresponding lip prints as "Figura Linearum Labiorum Rubrorum" by them. In 1981, Cottone reported cheiloscopy as a special technique for the purpose of individual identification.^[3] A lip print is different in every living individual and does not change with time therefore it can be used as a tool in

forensic investigations. A lip print may be revealed as a stratified surface trace with visible elements of lines, namely the furrows and if the lines are not clear, only the shape of lips is printed. It has been confirmed that these furrows recover after undergoing alterations like trauma, inflammation, and diseases like herpes. Also the disposition and form of the furrows does not change with environmental factors.^[4] Lip print on drinking glass or cigarette butt found at crime scenes may link to a suspect.

The one of the most emerging methods of human identification, which originates from the criminal and forensic practice, is human lips recognition.^[5] Fischer in 1902 was the first anthropologist to describe the furrows on the red part of human lips.^[6] However, it was in 1932 that Edmond Locard,^[7] one of the Criminologists recommended the use of lip prints in personnel identification and criminalization. It is a method of identification of a person based on the characteristic arrangement of lines appearing on the red part of the lips. Cheiloscopy in its present stage of development has surpassed the limits of a method and has become a means of criminalistics identification. Lipstick smears can lead

Access this article online

Quick Response Code:



Website:
www.najms.org

DOI:
10.4103/1947-2714.115777

to indirect proof of a relationship or contact between a victim and a suspect or a suspect and a crime scene.^[8] Those latent or invisible lip prints can be detected using aluminum powder and magnet powder as mentioned by Sharma *et al.*^[9] The lipstick-cellophane tape method was used in lifting lip print was described first by Bindal *et al.*^[10] The use of lipstick is not inevitable as latent prints are available at all crime scenes because of the presence of minor salivary glands and sebaceous glands. Santos^[11] in 1967 classified lip grooves into four types (straight line, curved line, angled line, and sine shaped line).

Suzuki and Tsuchihashi in 1970 devised a new classification of lip grooves as:

- 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 – Undetermined.

The intercommissural distance (ICD) in relaxed state is measured between the corners of the mouth. It corresponds to the width of maxillary anterior teeth and can be used as a guide for the selection of maxillary dental prosthesis. ICD could be utilized in forensic odontology for the identification of a person, if he/she was a denture wearer. The inter labial gap during relaxed state, can be used to assess the lip competency. The lip competency records in human beings could be matched with past facial profile photographs or lateral cephalogram records for identification in mass disaster.^[12]

Thus a dental surgeon has to actively play his role in personal identification and criminal investigation, as his evidence would be very much useful in law and justice.

This study will investigate the correlation of lip print pattern to gender, ABO blood groups, and ICD in Sriganganagar, Rajasthan.

Materials and Methods

The study was conducted on 208 randomly selected students of Surendera Dental College and Research Institute, Sriganganagar, Rajasthan, out of which 123 were females and 85 were males, aged between 18 and 25 years from October 2012 to March 2013. All the subjects were briefed about the purpose of the study and a written informed consent was obtained. The Institutional ethical approval was obtained to carry out the study. The subjects undergoing orthodontic treatment, presence of congenital lip abnormalities, inflammation or trauma of lips, hypersensitivity to lipsticks were excluded from the study.

Study materials

Red flamed lip stick, lip brush, cellophane tape (45 mm width), white A4 bond paper, electronic digital calipers, magnifying glass (10 cm diameter), anti-A sera, anti-B sera, and anti-Rh sera for ABO blood group testing.

Technique

The lips of the subjects were cleaned and a red lipstick was applied evenly with a single stroke using lip brush over the vermilion border and the subjects were asked to rub both the lips to spread the applied lipstick uniformly. After 2 minutes, the glued portion of the cellophane tape was placed over the lipstick. The lip prints were taken in the normal rest position by dabbing in the center first and then pressing it comfortably toward the corners of the lips. The cellophane strip was then stuck to the white bond paper for a permanent record. The lip prints were then analyzed following Tsuchihashi classification using a magnifying glass by two Forensic experts independently [Figure 1]. Each lip was divided into six areas starting from right upper area to right lower area (A1–A6). The type of lip print was assessed in all the six areas and the type, which was repeated the maximum number of times, was considered as described by Rajendran and Sivapathasundram.^[13] The short upper lip and proclined upper anterior teeth with interlabial gap in relaxed position was noted clinically to record the competency of lips.^[14,15] The ICD (in cm) for each subject was recorded at rest position using electronic digital calipers.

The blood group of the subjects were identified by placing a drop of blood on the slide and treated with anti-A, anti-B, and then on anti-Rh sera. Positive agglutination of

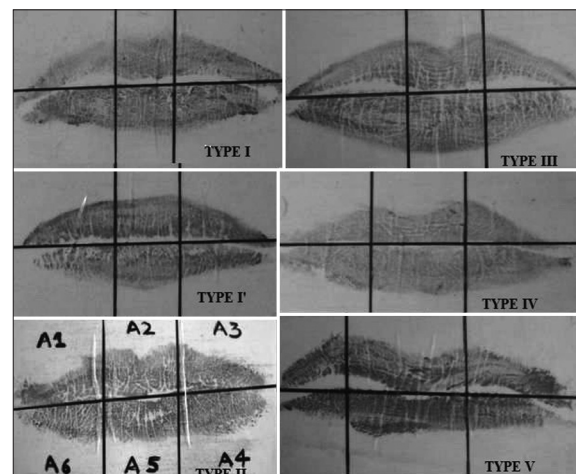


Figure 1: Different lip print patterns. Type I-Vertical groove across the lip, Type I'-Partial length groove, Type II-Branched groove, Type III-Intersected groove, Type IV-Reticular pattern, Type V-Undetermined

the blood on treating with anti-A is considered as blood group A, positive reaction with anti-B is considered as blood group B, if no agglutination is produced then the blood group is O and if agglutination is seen with both antisera then blood group AB is considered. Similarly positive agglutination reaction with Rh antigen is considered Rh+ or otherwise Rh-. The results were analyzed using SPSS 20.0(Microsoft Corporation Inc., Chicago, IL, USA) statistical software.

Results

Among the total of 208 individuals, 40.9% belonged to blood group "B Positive," followed by 29.8% of "O Positive," about 14.4% of "A Positive," 10% "AB Positive," 2.8% "B Negative," and "AB Negative," "A Negative" being 0.9%, respectively [Table 1].

The results of the two observers were analyzed for lip patterns by Wilcoxon signed-rank test showing insignificant inter-observer bias [Figure 2].

The general distribution of lip prints in the given population was in the order of branched type (47.6%) followed by intersecting (23.1%), vertical, partial length groove, reticular, and undetermined type [Table 1].

Frequency of Type I, Type I', Type II and Type III lip prints was more among the B+ group. Distribution of Type IV lip prints was equal among A+ and O+ while

Type V showed increased expression among individuals with A+ blood group [Table 2].

The correlation was calculated between lip prints and blood groups and also lip prints with gender, both were found insignificant [Table 3].

Out of the total 208, 198 (95.2%) subjects were having competent lips while 10 (4.8%) were having incompetent lips. The Type II lip pattern was more common in competent lips while Type II and Type III was more among incompetent lips. The mean ICD of the sample was 4.96 cm, which was more in males (5.17 cm) than females (4.83 cm). The mean ICD is noted highest among Type II lip pattern subjects [Table 4].

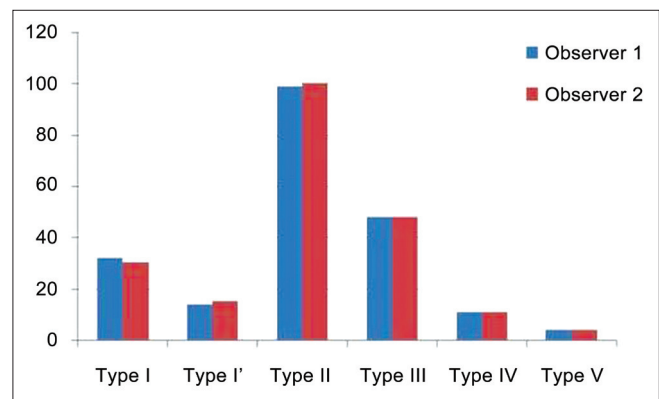


Figure 2: Frequency of lip print pattern by two observers

Table 1: Gender distribution of blood groups and lip print patterns

Blood group	Gender distribution			Lip print pattern	Gender distribution		
	Male (%)	Female (%)	Total (%)		Male (%)	Female (%)	Total (%)
A+	12 (40)	18 (60)	30 (14.42)	Type I	13 (40.62)	19 (59.37)	32 (15.38)
B+	33 (38.82)	52 (61.17)	85 (40.86)	Type I'	05 (35.71)	09 (64.28)	14 (6.73)
AB+	11 (52.38)	10 (47.62)	21 (10.09)	Type II	43 (43.4)	56 (56.56)	99 (47.59)
O+	27 (43.54)	35 (56.45)	62 (29.80)	Type III	19 (39.58)	29 (60.41)	48 (23.07)
A-	01 (50)	01 (50)	02 (0.01)	Type IV	05 (45.45)	06 (54.54)	11 (5.28)
B-	01 (16.67)	05 (83.33)	06 (2.89)	Type V	0	04 (100)	04 (1.92)
AB-	0	02 (100)	02 (0.96)				
O-	0	0	0				
Total	85 (40.86)	123 (59.13)	208	Total	85 (40.86)	123 (59.13)	208

Table 2: Distribution of lip prints with blood groups

Lip pattern	A+	B+	AB+	O+	A-	B-	AB-	O-
Type I (vertical)	03	16	04	09	00	00	00	00
Type I' (partial length groove)	03	07	01	02	00	01	00	00
Type II (branched)	14	38	11	28	02	04	02	00
Type III (intersected)	04	20	04	19	00	01	00	00
Type IV (reticular)	04	03	00	04	00	00	00	00
Type V (undetermined)	02	01	01	00	00	00	00	00
Total	30	85	21	62	02	06	02	00

Table 3: Correlation of lip prints with gender and blood groups

Variable	Chi-square	Degree of freedom df	Probability value (P value)
Gender	3.46	5	0.629*
Blood groups	25.22	30	0.71*

*NS: Nonsignificant

Table 4: Distribution of lip competency and Mean ICD in lip print patterns

Lip print pattern	Distribution of lip competency			Mean ICD (in cm)
	Competent lips	Incompetent lips	Total	
Type I	29	02	31	4.50
Type I'	13	02	15	4.68
Type II	96	03	99	5.01
Type III	45	03	48	4.98
Type IV	11	00	11	4.97
Type V	04	00	04	4.70
Total	198	10	208	

Discussion

The present study was conducted among 208 randomly selected subjects among which 57.5% were female and 42.5% were male. The lip pattern of the sample was studied independently by two forensic experts in six areas, that is, A1-A6, to find out any inter observer bias which was found insignificant by statistical analysis. The results showed that type II was the dominant pattern in male and female population. This was followed by type III pattern in both gender (22.4% in males and 45.5% in females). The results were in accordance with previous studies by Sivapathasundram *et al.*,^[16] and Manipady.^[17] Augustine *et al.*,^[4] stated that the minimum number of type V patterns should be seen in Tsuchihashi classification, as in the present study where no type V pattern was seen in female population, while only two male subjects showed the same pattern. The most common type of blood group was B+ in both males and females. The results revealed no significant correlation between distribution of lip print patterns and ABO blood group ($P = 0.71$). The results matched with previous studies done by Telagi *et al.*,^[18] in south India and Sandhu *et al.*,^[6] in Punjabi population. There is no statistically observed difference between males and females in individual lip print types ($P = 0.629$) as was seen in study conducted by Neo *et al.*,^[19] in Malaysian population. The mean ICD was found largest among branched lip pattern (Type II) subjects while overall mean ICD was more among males than females as reported by Temitope *et al.*^[20]

The competent lips were noted in 95% of the study population while incompetency of lips was seen only

in 5%. The results were in accordance with the Zamzam and Luther study.^[21] The Type II lip pattern subjects showed maximum competent lips while incompetent lips were equally seen among Type II and Type III lip print pattern subjects.

Conclusion

The study confirmed the distinctiveness of cheiloscopy but disproves any statistical correlation of lip print pattern with gender, ABO blood groups, or ICD. Further studies with larger samples are required to obtain statistical significance of this correlation.

References

1. Tsuchihashi Y. Studies on personal identification by means of lip print. *Forensic Sci* 1974;3:233-48.
2. Suzuki K, Tsuchihashi Y. Personal identification by means of lip print. *J Forensic Med* 1970;17:52-7.
3. Saraswathi TR, Mishra G, Ranganathan K. Study of lip prints. *J Forensic Dent Sci* 2009;1:28-31.
4. Augustine J, Barpande SR, Tupkari JV. Cheiloscopy as an adjunct to forensic identification: A study of 600 individuals. *J Forensic Odontostomatol* 2008;26:44-52.
5. Sandhu SV, Bansal H, Monga P, Bhandari R. Study of lip print pattern in a Punjabi population. *J Forensic Dent Sci* 2012; 4:24-8.
6. Kumar GS, Vezhavendhan N, Vendhan P. A study of lip prints among Pondicherry population. *J Forensic Dent Sci* 2012;4:84-7.
7. Thomas CJ, van Wyk CW. The palatal rugae in identification. *J Forensic Odontostomatol* 1988;6:21-7.
8. Patel S, Paul I, Madhusudan AS, Gayathri R, Sowmya GV. A study of lip prints in relation to gender, family and blood group. *Int J Oral Maxillofac Pathol* 2010;1:4-7.
9. Sharma P, Saxena S, Rathod V. Cheiloscopy: The study of lip prints in sex identification. *J Forensic Dent Sci* 2009;1:24-7.
10. Bindal U, Jethani SL, Mehrotra N, Rohatgi RK, Arora M, Sinha P. Lip prints as a method of identification in human being. *J Anat Soc India* 2009;58:152-5.
11. Santos M. Queiloscopy: A supplementary stomatological means of identification. *Int Microform J Legal Med* 1967;2:64-8
12. Karjodkar FR. *Textbook of Dental and Maxillofacial Radiology*. 2nd ed. New Delhi. Jaypee Publi; 2011. p. 929-64.
13. Rajendran R, Sivapathasundharam B. *Shafer's Text book of Oral Pathology*. 6th ed. London: Elsevier, Churchill Livingstone; 2009. p. 871-99.
14. Varjão FM, Nogueira SS. Intercommissural width in 4 racial groups as a guide for the selection of maxillary anterior teeth in complete dentures. *Int J Prosthodont* 2005;18:513-5.
15. Mahesh P, Rao SP, Pavan KT, Shalini K, Sankar V. An *in vivo* clinical study of facial measurements for anterior teeth selection. *Ann Essences Dent* 2012;4:1-6.
16. Sivapathasundharam B, Prakash PA, Sivakumar G. Lip prints (Cheiloscopy). *Indian J Dent Res* 2001;12:234-7.
17. Varghese AJ, Somasekar M, Umesh BR. A study on lip types among the people of Kerala. *J Indian Acad Forensic Med* 2010;32:6-7.

18. Telagi N, Mujib A, Spoorthi B, Naik R. Cheiloscopy and its patterns in comparison with ABO blood groups. *J Forensic Dent Sci* 2011;3:77-80.
19. Neo XX, Khairul O, Sri PA, Noor HH. Lip Prints in Sex and Race Determination. *J Sains Kesihatan Malaysia* 2012; 10:29-33.
20. Esan TA, Oziegbe OE, Onapokya HO. Facial approximation: evaluation of dental and facial proportion with height. *Afr Health Sci* 2012;12:63-8.
21. Zamzam N, Luther F. Comparison of lip incompetence by remote video surveillance and clinical observation in children with and without cerebral palsy. *Eur J Orthod* 2001; 23:75-84.

How to cite this article: Verma P, Sachdeva SK, Verma KG, Saharan S, Sachdeva K. Correlation of lip prints with gender, ABO blood groups and intercommissural distance. *North Am J Med Sci* 2013;5:427-31.

Source of Support: Nil. **Conflict of Interest:** None declared.

Announcement

iPhone App



Download
**iPhone, iPad
application**



A free application to browse and search the journal's content is now available for iPhone/iPad. The application provides "Table of Contents" of the latest issues, which are stored on the device for future offline browsing. Internet connection is required to access the back issues and search facility. The application is Compatible with iPhone, iPod touch, and iPad and Requires iOS 3.1 or later. The application can be downloaded from <http://itunes.apple.com/us/app/medknow-journals/id458064375?ls=1&mt=8>. For suggestions and comments do write back to us.