

“Analysis of Lip prints, Finger prints and Blood groups: A comparative study”

Dr. Surbhi Singh, M.D.S Oral Pathology¹, Dr. Sushruth Nayak, M.D.S², Dr. Nikita Kashyap, M.D.S³, Dr. Aravindan S⁴,

¹Dentist at Sawhney Dental Clinic and Implant Center, 530, Indira Nagar, Dehradun, Uttarakhand

²Professor & Head, Department of Oral and Maxillofacial Pathology and Oral Microbiology, Maharishi Markandeshwar College of Dental Sciences & Research, Maharishi Markandeshwar (Deemed to be university) Mullana, Ambala, Haryana.

³Research Assistant, Department of Oral and Maxillofacial Pathology and Oral Microbiology, Post Graduate Institute of Dental Sciences, Rohtak, Haryana.

⁴Post Graduate student, Department of Oral and Maxillofacial Pathology and Oral Microbiology Dr. R. Ahmed Dental College and Hospital, Sealdah, Kolkata, West Bengal

Corresponding Author:

Dr. Sushruth Nayak, M.D.S
Professor & Head
Department of Oral and Maxillofacial Pathology and Oral Microbiology
Maharishi Markandeshwar College of Dental Sciences & Research
Maharishi Markandeshwar (Deemed to be university)
Mullana, Ambala, Haryana -133207
INDIA.

KEYWORDS ABSTRACT

Background- In forensic dentistry, the oral cavity plays a very important role because of the unique anatomy of the teeth. Although DNA comparisons and finger print analysis are common techniques which are employed to ensure fast and secure identifications, there are certain crime scenarios where other supplemental aids like lip prints, palatal rugae pattern, bite marks, etc becomes indispensable. So the present study involved 3 parameters to analyze the most common patterns of lip print, finger print and blood group in the study population.

Materials and Methods- This study included 150 healthy individuals (75 males and 75 females) from the age group 18-30 years. Lip prints, Finger prints and Blood groups were obtained from all the individuals to analyze the different patterns.

Results- Lip print analysis was done between males and females and showed statistically insignificant results ($p=0.776$). Finger print examination showed significant results ($p<0.001$). The comparison between finger print group and lip print group was done ($p<0.002$) which was statistically significant. Blood group examination showed statistically insignificant results ($p=0.094$). Comparing finger print and blood group pattern was also statistically insignificant ($p=0.207$). On comparison of lip print pattern with blood group the results showed statistical insignificance ($p=0.596$).

Conclusion- In the given study, no significant association was established on finding out a correlation between lip print, finger prints and blood groups. Hence we conclude by giving a message that these individual parameters can be useful in the crime scenes for evidence purpose only.

Introduction: The basic and clinical disciplines of dentistry have shed light on civil and criminal law issues from time to time. Crime investigations require both the detection of victims of murder and of perpetrators. In most inquiries that involve comparative study, latent or chance impressions located on smooth surfaces are encountered. These impressions may arise from a number of sources, the most frequently encountered being impressions of areas of skin bearing friction ridges, predominantly those from the fingers¹. In forensic dentistry, the oral cavity plays a very important role because of the unique anatomy of the teeth. In certain situations, if the teeth are lost due to any reason, the most common of which is trauma, then the use of human palatal rugae has been suggested as an alternative method for identification².

Lip prints are similar to finger prints, palm prints and foot prints in that individual characteristics are used for identification. The creases on the vermilion border of the lips, which appear as white areas in lip prints, and the raised reddish areas outlined by these creases, which appear as dark areas, are analogous to the furrows and ridges of friction ridge skin. The creases on the vermilion border are also referred to as grooves, furrows, wrinkles and valleys. The study of this is referred to as cheiloscopy. Rugoscopy, the study of palatal rugae, finds application in the field of anthropology, comparative anatomy, genetics, forensic odontology, prosthodontics and orthodontics^{1,3}. Fingerprint is a unique characteristic of an individual made by curved lines of the skin at the end of the finger and is genotypically determined which remain unchanged from birth to death. The study of fingerprints is known as Dermatoglyphics. Blood groups are classified on the basis of presence or absence of antigens on the surface of the RBC's. The two most important blood groups are ABO (Landsteiner) and the Rh antigen which determines blood type⁴.

Material and Methods: The study was held in the Department of Oral And Maxillofacial Pathology and Oral Microbiology, M.M. College of Dental Sciences and Research, Mullana, Ambala. The ethical clearance was taken for the research work by the Institutional Ethical Committee (Project No.: IEC- 1822). The study group consisted of 150 healthy individuals (75 males and 75 females) from the age group 18-30 years. Healthy individuals from age group of 18-30 year with no lesion on the lips and fingers were included in the study. Exclusion criteria for lip prints included subjects undergoing orthodontic treatment, congenital lip abnormalities, inflammation or trauma to the lips and hypersensitivity to lipsticks, whereas for finger prints; subjects with syndromes and permanent scars on their thumbs and any hand deformities caused by injuries. Blood groups of the patients were documented along with their age group.

Methodology:

Lip prints (Cheiloscopy): The lip of the individuals were cleaned and dried with sterile gauze piece. Bright colored lipstick was applied uniformly in the same direction with a cotton bud on both the upper and lower lips. The subjects were asked to rub both the lips and spread the applied lipstick. A strip of cellophane tape was cut with the scissors and after about 1 minute the glued portion of the cellophane tape will be placed over the lipstick. The cellophane tape was held in place with mild and even pressure for few seconds to allow the print to form on the tape. The cellophane tape was then stuck to the white bond paper to serve as a permanent record. The grooves present in the middle portion of the lower lip were visualized [**Figure 1**].



Figure1: Lip prints of the study groups The patterns were observed using the magnifying glass according to the classification given by Tsuchihashi as Type I: Clear cut vertical grooves that run across the entire lip, Type I': Similar to type I, but do not cover the entire lip, Type II: Branched grooves, Type III: Intersected grooves, Type IV: Reticular grooves, and Type V: Grooves that do not fall into any of the category from I to IV and cannot be differentiated morphologically (undetermined).

Finger prints (Dermatoglyphics): For recording the finger prints, left thumb imprint was taken. These prints were taken using the stamp pad and transferred on to the bond sheet. The prints were later examined for the patterns using the magnifying glass [Figure 2]. Later these finger prints were analyzed using Michael and Kucken classification as Loop, Arch, and Whorl pattern.

Figure2: Finger prints of the study groups



Blood groups: The blood group of each individual was documented, following which the lip and finger prints were recorded.

Results: In the analysis of lip prints between males and females, out of 75 males, 36% showed type I pattern. Likewise, out of 75 females, 36% also showed type I pattern. Chi- square test revealed ($p= 0.776$) which was statistically insignificant [Table 1] [Graph 1]. In the analysis of finger print pattern, out of 75 males, 69.3% subjects had loop pattern. Whereas out of 75 females, 40% had loop type finger print pattern. The probability was statistically significant ($p< 0.001^{**}$) [Table 2] [Graph 2]. In blood group determination, the most common blood group in the study group was found to be B^{+ve} 40 (26.7%) and O^{+ve} 40 (26.7%) and the results were statistically insignificant ($p=0.094$) [Table 3] [Graph 3].

Table 1- Distribution of lip print patterns in the study group (n=150)

		Gender						Chi-Square	p-value
		Male		Female		Total			
Lip Prints	Type-I	27	36.0%	27	36.0%	54	36.0%	2.500	0.776
	Type-I'	7	9.3%	8	10.7%	15	10.0%		
	Type-II	23	30.7%	26	34.7%	49	32.7%		
	Type-III	7	9.3%	7	9.3%	14	9.3%		
	Type-IV	9	12.0%	7	9.3%	16	10.7%		
	Type-V	2	2.7%	0	0.0%	2	1.3%		
	Total	75	100.0%	75	100.0%	150	100.0%		

Graph 1- Graph between the study population and lip print patterns

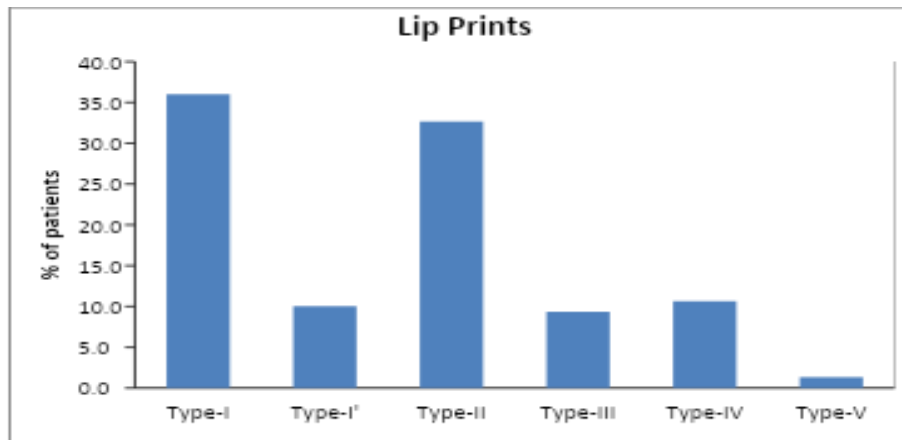


Table 2- Distribution of Finger print pattern in the study group (n=150)

		Gender						Chi-Square	p-value
		Male		Female		Total			
Finger Group	Arch	10	13.3%	27	36.0%	37	24.7%	14.520	.001**
	Loop	52	69.3%	30	40.0%	82	54.7%		
	Whorl	13	17.3%	18	24.0%	31	20.7%		
	Total	75	100.0%	75	100.0%	150	100.0%		

Graph 2- Distribution of Finger print pattern in the study group (n=150)

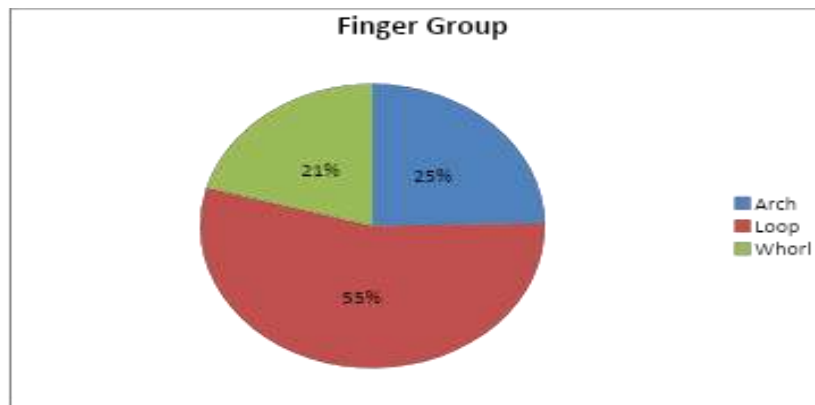
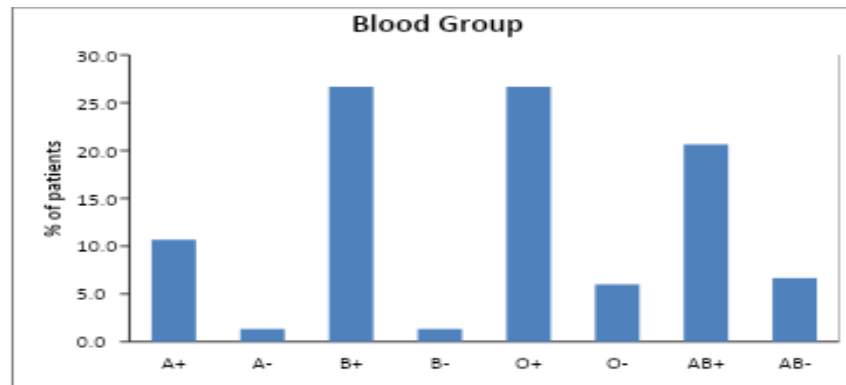


Table 3- Distribution of blood group in the study group (n=150)

		Gender						Chi-Square	p-value
		Male		Female		Total			
Blood Group	A+	7	9.3%	9	12.0%	16	10.7%	12.208	0.094
	A-	2	2.7%	0	0.0%	2	1.3%		
	B+	16	21.3%	24	32.0%	40	26.7%		
	B-	2	2.7%	0	0.0%	2	1.3%		
	O+	16	21.3%	24	32.0%	40	26.7%		
	O-	7	9.3%	2	2.7%	9	6.0%		
	AB+	19	25.3%	12	16.0%	31	20.7%		
	AB-	6	8.0%	4	5.3%	10	6.7%		
	Total	75	100.0%	75	100.0%	150	100.0%		

Chi- square value- 28.413, p- value- 0.002**

Graph 3- Distribution of study population and blood groups



The comparison between finger print group and lip print group was done and statistically significant difference ($p < 0.002^{**}$) was established [Table 4]. Another comparison between finger print group and blood group was done and the results were statistically insignificant ($p = 0.207$) [Table 5]. Comparison of lip print pattern group and blood group was done and the results were statistically insignificant ($p = 0.596$) [Table 6]. Distribution of blood groups, finger print pattern and lip print pattern combinations in the study group was also done [Table 7].

Table 4- Distribution of lip print and finger print pattern combinations in the study (n=150)

		Finger Group							
		Arch		Loop		Whorl		Total	
Lip Prints	Type-I	12	32.4%	32	39.0%	10	32.3%	54	36.0%
	Type-I'	5	13.5%	7	8.5%	3	9.7%	15	10.0%
	Type-II	9	24.3%	34	41.5%	6	19.4%	49	32.7%
	Type-III	3	8.1%	8	9.8%	3	9.7%	14	9.3%
	Type-IV	8	21.6%	1	1.2%	7	22.6%	16	10.7%
	Type-V	0	0.0%	0	0.0%	2	6.5%	2	1.3%
	Total		37	100.0%	82	100.0%	31	100.0%	150

Chi- square value- 28.413, p- value- 0.002**

Table 5- Distribution of finger print group and blood group combinations in the study (n=150)

		Finger Group							
		Arch		Loop		Whorl		Total	
Blood Group	A+	5	13.5%	10	12.2%	1	3.2%	16	10.7%
	A-	0	0.0%	2	2.4%	0	0.0%	2	1.3%
	B+	7	18.9%	22	26.8%	11	35.5%	40	26.7%
	B-	0	0.0%	2	2.4%	0	0.0%	2	1.3%
	O+	16	43.2%	14	17.1%	10	32.3%	40	26.7%
	O-	0	0.0%	7	8.5%	2	6.5%	9	6.0%
	AB+	7	18.9%	19	23.2%	5	16.1%	31	20.7%
	AB-	2	5.4%	6	7.3%	2	6.5%	10	6.7%
	Total	37	100.0%	82	100.0%	31	100.0%	150	100.0%

Chi- square value- 17.995, p- value- 0.207

Table 6-Distribution of lip print group and blood group comparison in the study (n=150)

Blood Group	Lip Prints													
	Type-I		Type-I'		Type-II		Type-III		Type-IV		Type-V		Total	
A+	6	11.1%	3	20.0%	7	14.3%	0	0.0%	0	0.0%	0	0.0%	16	10.7%
A-	2	3.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	1.3%
B+	1 2	22.2%	3	20.0%	1 6	32.7%	3	21.4%	5	31.3%	1	50.0%	40	26.7%
B-	0	0.0%	1	6.7%	0	0.0%	1	7.1%	0	0.0%	0	0.0%	2	1.3%
O+	1 3	24.1%	5	33.3%	8	16.3%	5	35.7%	8	50.0%	1	50.0%	40	26.7%
O-	4	7.4%	0	0.0%	4	8.2%	0	0.0%	1	6.3%	0	0.0%	9	6.0%
AB+	1 2	22.2%	3	20.0%	1 0	20.4%	4	28.6%	2	12.5%	0	0.0%	31	20.7%
AB-	5	9.3%	0	0.0%	4	8.2%	1	7.1%	0	0.0%	0	0.0%	10	6.7%
Total	5 4	100.0 %	1 5	100.0 %	4 9	100.0 %	1 4	100.0 %	1 6	100.0 %	2	100.0 %	15 0	100.0 %

Chi- square value- 32.362, p- value- 0.596

Table 7- Distribution of lip print group, finger print and blood group comparison in the study (n=150)

Finger Group	Lip Prints	A+	A-	B+	B-	O+	O-	AB+	AB-
	Type I	3 2%	0 0%	2 1.33%	0 0%	5 3.33%	0 0%	2 1.33%	0 0%
	Type I'	0 0%	0 0%	1 1.50%	0 0%	3 2%	0 0%	1 0.66%	0 0%
Arch	Type II	2 1.33%	0 0%	2 1.33%	0 0%	2 1.33%	0 0%	2 1.33%	1 0.66%
	Type III	0 0%	0 0%	0 0%	0 0%	1 0.66%	0 0%	1 0.66%	1 0.66%
	Type IV	0 0%	0 0%	2 1.33%	0 0%	5 3.33%	0 0%	1 0.66%	0 0%
	Type V	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Loop	Type I	2 1.33%	2 1.33%	8 5.33%	0 0%	5 3.33%	3 2%	8 5.33%	4 2.66%
	Type I'	3 2%	0 0%	1 0.66%	1 0.66%	1 0.66%	0 0%	1 0.66%	0 0%
	Type II	5 3.33%	0 0%	1 7.33%	0 0%	5 3.33%	4 2.66%	7 4.66%	2 1.33%
	Type III	0 0%	0 0%	1 0.66%	1 0.66%	3 2%	0 0%	3 2%	0 0%
	Type IV	0 0%	0 0%	1 0.66%	0 0%	0 0%	0 0%	0 0%	0 0%
	Type V	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Whorl	Type I	1 0.66%	0 0%	2 1.33%	0 0%	3 2%	1 0.66%	2 1.33%	1 0.66%
	Type I'	0 0%	0 0%	1 0.66%	0 0%	1 0.66%	0 0%	1 0.66%	0 0%
	Type II	0 0%	0 0%	3 2%	0 0%	1 0.66%	0 0%	1 0.66%	1 0.66%
	Type III	0 0%	0 0%	2 1.33%	0 0%	1 0.66%	0 0%	0 0%	0 0%
	Type IV	0 0%	0 0%	2 1.33%	0 0%	3 2%	1 0.66%	1 0.66%	0 0%
	Type V	0 0%	0 0%	1 0.66%	0 0%	1 0.66%	0 0%	0 0%	0 0%

Discussion: Identification of humans is considered to be the most demanding aspect in today's time. Cheiloscopy and dactylographic prints are the most useful tools in forensic identification and are not only used for the identification of suspects at the crime scene but also for gender determination. Blood group is also considered as an effective tool in the process of investigation. Fingerprints and lip prints are considered to be the most crucial source of identification. Lip prints remain the same throughout life and any environmental change does not have any impact on them. In the present study of 75 males and 75 females, the predominant lip print pattern amongst the males was type I pattern. Amongst the females also it as type I pattern which was the predominant type. Finger print analysis in our study showed that loop type finger print pattern was predominant type amongst males and females both in the study population. Blood group analysis in our study showed that in males the predominant blood group in males was AB+ whereas in females B+ and O+ were the predominant types.

On finding a correlation between the 3 parameters i.e lip prints, blood groups and finger prints, it was found out that the comparison between finger print and lip print showed significant results. The results of our study were in accordance with the results of the study by Alam BF et al.,2021 that also showed stastically significant results ($p < 0.001$)⁵. Another stud done b Sonia Bai et al in 2018, showed significant correlation between lip and finger print pattern which were in accordance with our result⁶.

Misra et al., in 2017 conducted similar study like the present study an found that the correlation between lip prints,, finger prints and blood groups in males was found to be statistically significant ($p < 0.001$) but in females it was non significant⁷. In comparison our study showed statistically

significant value ($p < 0.001$) only for correlation between lip and finger print pattern. Other correlations were statistically insignificant.

Conclusion

It was concluded that all these individual variables which include lip prints, finger prints and blood groups play an important role in forensic science and identification of crimes. However, in the given study, no significant association was established on finding out a correlation of all the above three parameters. Hence we conclude by giving a message that these individual parameters can be useful in the crime scenes for evidence purpose only.

Conflict of Interests: Nil

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