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Association Between Lip Prints and Blood Groups Among Koya University Students

Harem Othman Smail, Rezhna Khder Hassan, Helin Omer Ismail
Department of Biology, Faculty of Science and Health, Koya University, Koya 44023, Kurdistan Region – F.R. Iraq.

Corresponding author*
harem.othman@koyauniversity.org

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Abstract

Lip prints, also known as cheiloscopy, are designs created by the positioning of creases and lines around the red edge of a person's lip. In forensic science, lip prints can be used for identification just like fingerprints. Blood is categorized into blood groups, sometimes called blood types, according to whether or not specific antigens are present on the surface of red blood cells. The aim of this project was to discover the correlation between lip prints and blood groups. A study involving 334 volunteers aged 18-25, collected at Koya University, used standard blood typing methods to determine their blood groups. Our results discovered a correlation between lip prints and blood groups in females; there is a correlation, but in males, there is not a correlation. The research indicates a correlation between blood groups and lip print patterns, suggesting that lip print traits may be linked to blood groups in females.

Keywords: Lip prints; Blood groups; Cheiloscopy; sexes; lip-print classification.

INTRODUCTION

Cheiloscopy is the study of the grooves and furrows found on the red portion of the human lip, also known as the vermilion border. A person's groves are specific to them and can be used to identify them (Bhattacharjee *et al.,*2024, Kesarwani and Choudhary.2021). Lip prints, or "cheiloscopy" (derived from the Greek words cheilos, which means "lips," and skopein, which means "see"), have been suggested as an extra tool in criminal investigations because to the distinctiveness of labial pattern grooves and the similarity of their applicability to fingerprints (Nagalaxmi *et al.,*2015, Fonseca *et al.*, 2019). It was anthropologists who first observed this biological phenomenon. It was initially described in 1902 by R. Fischer. Similar to finger prints, a person's lip print is unique and does not alter over time. It has been confirmed by me that they recover from changes such as trauma, inflammation, and illnesses like herpes, and that environmental influences have no effect on the disposition or form of the furrows (Ghimire *et al*., 2013). Because labial grooves are thought to be unique, lip print identification has been suggested as an additional technique for criminal investigation. Similar to fingerprints, each person has a unique pattern on their lips, and no two patterns are same. Lip prints are thus still another method of identification. (Pearce *et al*., 2021).

Lip prints can be distinguished as early as the sixth week of intrauterine life, and after that, they hardly ever alter in pattern. (Jeergal *et al.,* 2016). Suzuki and Tsuchihashi (1970) created the lip-print classification scheme that is now in use (Suzuki and Tsuchihashi, 1970). Lip prints were categorized as follows by them: Type I' is a partial length Type I groove, Type II is a branched groove, Type III is an intersected groove, Type IV is a reticular pattern, and Type V is an undifferentiated groove. Type l is a clear-cut groove that runs vertically across the lips (Sathawan *et al., 2019*). The phrase "blood group" describes the whole blood group system, which includes red blood cell (RBC) antigens. A set of genes, some of which may be allelic or closely related on the same chromosome, regulates the specificity of these RBC antigens. In 1900, Karl Landsteiner is credited with discovering the ABO blood group system. His thorough studies on serology, which were grounded in sound scientific theory but also in simplicity, allowed for the identification of the major blood types, including 0, A, and B. (Mitra *et al.,2014)*

METHODOLOGY

Cases

We collected lip print samples from 334 individuals selected from Koya University and determined their blood groups using standard blood typing methods, such

as the ABO and Rh blood group systems. We collected lip print samples from a total of 334 individuals, consisting of 179 females and 155 males. We analyzed the collected lip print samples and recorded the lip prints on clean paper from each individual, categorizing them based on different lip print patterns. We performed a statistical analysis to identify any correlation between specific lip print patterns and blood groups.

Lip print procedure

Before beginning the operation, make sure the lips are clean and dry. Lipstick Application: Evenly spread a thick coat of lipstick over your lips. Select a hue that will make a statement on the paper you plan to use to capture the print. Pressing the Lips into Paper: Take a fresh piece of white paper and gently press the lips onto it. For a clear print, use consistent pressure. Take a Print: Gently lift your lips off the paper to see the lip print that was made on the surface. Analysis: Look for distinctive features including lines, wrinkles, and grooves in the lip print. Based on the patterns they exhibit, lip prints can be categorized into several types. Use a dissecting microscope if needed (Smail *et al.,*2024)

Statistical analysis

The chi-square test was conducted to investigate the association between lip print patterns and the ABO blood group. Statistical analyses were performed using SPSS software version 20, and P-values < 0.05 were deemed statistically significant.

RESULT

Of the 334 subjects, 90.1% were Rh-positive and 9.9% were Rh-negative (Table 1). The most common blood group was O (41.9%), which was followed by A (33.5%), B (14.4%), and AB (10.2%). Blood group O was most common (45.2%) among males (n = 155), followed by A (36.1%), B (11.6%), and AB (7.1%). Females (n = 179) showed a similar pattern, with O being the most common (39.1%), followed by A (31.3%), B (16.7%), and AB (13.0%) (Table 2). The distribution of blood groups was not significantly different between the sexes.The complete vertical pattern (33.8%) was the most prevalent type of lip print, followed by reticular (15.9%), intersected (25.1%), and branched (11.7%). The least common patterns were incomplete vertical (3.6%) and undetermined (5.4%) (Table 3). Blood group and lip print patterns were found to be statistically significantly correlated ($\chi^2 = 55.731$, $p = 0.014$) (Table 4). Blood group O was most commonly linked to complete vertical patterns (46.9%), followed by group A (30.5%). Notable group-to-group distributions were also seen in intersected and reticular patterns, with O and A being the most prevalent. The correlation between blood groups and lip print patterns was not statistically significant among males (n = 155) ($\chi^2 = 37.858$, $p = 0.340$) (Table 5). For the majority of blood groups, especially O and A, the full vertical pattern predominated. A statistically significant correlation between blood group and lip print patterns was observed among females (n = 179) ($\chi^2 = 51.270$, $p = 0.037$) (Table 6). While reticular patterns displayed greater proportions in groups A and AB, complete vertical and intersected patterns were more common in groups O and A.

Table 1. Distribution of subjects according to Rh blood group.

Blood groups	Rh Blood groups	
	Rh-positive	Rh-negative
A	103(30.8%)	9(2.7%)
B	40(12%)	8(2.4%)
AB	31(9.3%)	3(0.9%)
O	127(38%)	13(3.9%)
Total	301(90.11%)	33(9.88%)

Table 2. Distribution of cases based on the sex and blood groups.

Sexes	Blood groups								Total
	A		B		AB		O		
	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative	
Male	52(33.5%)	4(2.6%)	14(9%)	4(2.6%)	9(5.8%)	2(1.3%)	64(41.3%)	6(3.9%)	155(100%)
Female	51(28.5%)	5(2.8%)	26(14.5%)	4(2.2%)	22(12.3%)	1(0.6%)	63(35.2%)	7(3.9%)	179(100%)
Total	103(30.8%)	9(2.7%)	40(12%)	8(2.4%)	31(9.3%)	3(0.9%)	127(38%)	13(3.9%)	334(100%)

Table 3. General distributions of Lip print patterns both sexes and all blood groups.

Types of lip print	Total	%
Complete vertical	128	33.8
Incomplete vertical	12	3.6
Branched	39	11.7
Intersected	84	25.1
Reticular	53	15.9
Undetermined	18	5.4
Total	334	100

Table 4. Associations of pattern of lip print among subjects of A, B, O and Rh blood groups (n =334) for both sexes.

Type of lip print	Blood groups							
	A		B		AB		O	
	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative
Complete vertical	38(29.7%)	1(0.8%)	14(10.9%)	6(4.7%)	8(6.2%)	1(0.8%)	56(43.8%)	4(3.1%)
Incomplete vertical	6(50%)	1(8.3%)	2(16.7%)	2(16.7)	1(8.3%)	0(0%)	0(0%)	0(0%)
Branched	11(28.2%)	0(0%)	5(12.8%)	0(0%)	4(10.3%)	0(0%)	16(41%)	3(7.7%)
Intersected	24(28.6%)	5(6%)	12(14.3%)	0(0%)	6(7.1%)	1(1.2%)	34(40.5%)	2(2.4%)
Reticular	16(30.2%)	2(3.8%)	4(7.5%)	0(0%)	10(18.9%)	0(0%)	17(32.1%)	4(7.5%)
Undetermined	8(44.4%)	0(0%)	3(16.7%)	0(0%)	2(11.1%)	1(5.6%)	4(22.2%)	0(0%)
Total	103(3.8%)	9(2.7%)	40(12%)	8(%2.4)	31(9.3%)	3(0.9%)	127(38%)	13(3.9%)
Statistics	**The chi-square statistic is 55.731. The p-value is 0.014. The result is significant at p < 0.05**							

Table 5. Associations of pattern of lip print among subjects of A, B, O and Rh blood groups (n =155) of males.

Type of lip print	Blood groups							
	A		B		AB		O	
	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative
Complete vertical	26(50%)	1(25%)	7(50%)	4(100%)	4(44.4%)	1(5-%)	35(54.6%)	2(33.3%)
Incomplete vertical	1(1.9%)	1(25%)	1(7.1%)	0(0%)	1(11.1%)	0(0%)	0(0%)	0(0%)
Branched	6(11.5%)	0(0%)	1(7.1%)	0(0%)	2(22.2%)	0(0%)	8(12.5%)	2(33.3%)
Intersected	13(25%)	2(50%)	4(28.5%)	0(0%)	1(11.1%)	0(0%)	15(23.4%)	1(16.6%)
Reticular	2(3.8%)	0(0%)	1(7.1%)	0(0%)	1(11.1%)	0(0%)	3(4.6%)	1(16.6%)
Undetermined	4(7.6%)	0(0%)	0(0%)	0(0%)	0(0%)	1(50%)	3(4.6%)	0(0%)
Total	52(100%)	4(100%)	14(100%)	4(100%)	9(100%)	2(100%)	64(100%)	6(100%)
Statistics	**The chi-square statistic is 37.858. The p-value is 0.340. The result is not significant at p < 0.05**							

Table 6. Associations of pattern of flip print among subjects of A, B, O and Rh blood groups (n =179) of females.

Type of lip print	Blood groups							
	A		B		AB		O	
	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative	Rh-positive	Rh-negative
Complete vertical	12(23.5%)	0(0%)	7(26.9%)	2(50%)	4(18.1%)	0(0%)	21(33.3%)	2(28.5%)
Incomplete vertical	5(9.8%)	0(0%)	1(3.8%)	2(50%)	0(0%)	0(0%)	0(0%)	0(0%)
Branched	5(9.8%)	0(0%)	4(15.3%)	0(0%)	2(9%)	0(0%)	8(12.6%)	1(14.2%)
Intersected	11(21.5%)	3(60%)	8(30.7%)	0(0%)	5(22.7%)	1(100%)	19(30.1%)	1(14.2%)
Reticular	14(27.4%)	2(40%)	3(11.5%)	0(0%)	9(40.9% (	0(0%)	14(22.2%)	3(42.8%)
Undetermined	4(7.8%)	0(0%)	3(11.5%)	0(0%)	2(9%)	0(0%)	1(1.5%)	0(0%)
Total	51(100%)	5(100%)	26(100%)	4(100%)	22(100%)	1(100%)	63(100%)	7(100%)
Statistics	**The chi-square statistic is 51.270. The p-value is 0.037. The result is significant at p < 0.05**							

Figure 1. Figure of lip pattern.

DISCUSSION

Lip prints are like fingerprints that are used for identification. We have six types of lip prints that we associate with blood groups. The blood group is another biological document that remains the same throughout the entire life of an individual (Biswas *et al.,* 2020). The results of lip print types vary among populations, as shown in Table 1. There are four types of blood groups, and the shape of the lip grooves remains the same from birth until death. This experiment investigates the association between lip prints and blood groups in general. The results of our experiment are compared with those of others, and it is found that the association of lip prints with blood groups is not specific to one type of blood group; it applies to all blood types. Our results indicate that lip prints are associated with blood groups in females, as shown in Table 6. However, there is no association in males, as shown in Table 5, and we compare this with other results. These results correspond with the previous studies in India with the Ancestral North Indian population sample by Karim and Gupta (2013), which stated that there was no significant correlation between lip print patterns and blood type (Sosiawan *et al.,* 2021). This experiment was conducted at Koya University and involved 334 randomly selected healthy volunteers aged 18-25 years, including 155 males and 179 females. Statistical analysis was used to analyze the results. The ABO Rh blood group was also recorded for each subject.

The study of lip print patterns, known as Cheiloscopy, is based on the arrangement of ridges and grooves on the vermillion zones of the lips. There are six types of lip print patterns: Type I, Type II, Type III, Type IV, Type V, and Type VI. When investigating the lip print pattern and its correlation with blood groups, a P-value of less than 0.05 indicates an association, while a P-value greater than 0.05 indicates no association. The correlation of lip prints with ABO blood groups and fingerprints may be more useful in forensic science for the accurate identification of an individual (Sandhu *et al.,* 2017). There isn't much prior research comparing blood groups and lipprints, but Suzuki and Tsuchihashi have found that there is some relationship between the two and that the types of lip prints are inherited similarly to blood group inheritance (Kesarwani and Choudhary 2021).

More research on various demographic groups is required in order to examine the variances and create a database in order to fully use the huge significance of cheiloscopy in forensic investigations. Standardizing the procedure for collecting, developing, preserving, and examining lip prints is desperately needed. It is crucial to use cheiloscopy to elucidate some aspects of personal identification (Karim and Gupta 2014). Methodological differences, such as how similarity is defined, that contribute to the heterogeneity of outcomes were found

in the seven included research. Since it was not established that parent-child similarities occur consistently across all families, the data collected allowed for the conclusion that there is no compelling scientific evidence to support the theory that there is heredity in the surface structure of lip prints (Chaves *et al.,*2023). Although authors still employ the idea of lip pattern uniqueness today, the majority of their study has not been able to substantiate this theory in accordance with modern scientific standards. The studied literature hardly mentions concepts and approaches required to assess materials for lip print production, such as DNA isolation, inter-rater reliability in identifying their patterns, or recognized possible rate of error (Fonseca *et al.,*2019).

CONCLUSION

In conclusion, our research has shown a relationship between blood groups and lip print patterns, suggesting that particular lip print traits might be connected to specific blood groups.

Competing Interest: The authors declare that there are no competing interests.

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