



International Journal of Applied Dental Sciences

ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2020; 6(4): 452-458
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www.oraljournal.com
Received: 15-08-2020
Accepted: 21-10-2020

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Correlation of lip prints, palm prints and abo blood group among student based population in Mangalore

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DOI: <https://doi.org/10.22271/oral.2020.v6.i4g.1101>

Abstract

Aim: To determine the correlation between Lip prints, Palm prints and ABO Blood Groups which may help in determining sexual dimorphism and forensic identification.

Materials and Methods: 100 healthy subjects, 18 to 25 years of age and a native of Mangalore population were randomly selected. Lip prints and palm prints were recorded using the manual techniques for each subject along with their authentic blood group report. Lip prints and palm prints were recorded according to classifications given by Suzuki and Tsuchihashi, and Wu *et al.*, respectively.

Results: The most common lip and palm pattern recorded was Type II and Category V respectively in both the genders. The most common blood groups in both genders was B+. Correlation between three parameters was obtained by Pearson correlation statistical analysis.

Conclusion: The lip prints and palm prints of an individual have never been similar and they tend to remain same from birth till death. This study was an effort made by us to associate lip prints, palm prints and blood groups of an individual, to aid in forensic identification.

Keywords: Lip prints, palm prints, blood groups, forensics tool, personal identification

Introduction

The word 'Forensic' is derived from a Latin term, 'Forensis' which means the art or public study. The word 'science' may be defined by research using the scientific methods as systematized knowledge. The area of science that can be used for the jurisdictional situation and is considered by the court of law and the universal scientific community as valid evidence for distinguishing facts from falsehood is implied of forensic medicine [1].

Although the most widely used identification methods are DNA analysis, fingerprint analysis, etc., other additional aids, such as palatal rugae patterns, bite marks, ABO blood stains and lip prints, are equally necessary for accurate identification in the current scenario [1, 2].

Palm prints, lip prints, and traces of blood are common proofs that can be used to identify forensics. The use of these three physical parameters is of vital importance, as attempting to identify a person by means of DNA analysis which is a sensitive and expensive process, thus making it difficult to use in every situation [3].

Various detection methods including Cheiloscopy, Rugoscopy, collecting impressions, or using a molecular technique such as PCR is used by the forensic dentist to examine the DNA found in dental pulp tissue [4]. The lip prints are fissures, present as wrinkles and grooves between the skin and outer part of labial mucosa in the transition of the human lip. The study of these patterns is called Cheiloscopy [5] that can be recorded by agents such as magnetic powders of aluminum, silver metallic, silver nitrate, carbonate, cobalt oxide and fat black aniline dye [6]. Dermatoglyphics can be described as the scientific analysis and modification on the volar aspect of the palmar and plantar regions of the epidermal ridges. The palmar hand surfaces have friction ridges, called papillary or epidermal ridges. The epidermal ridges are developed by 10th to 16th weeks. The heart line, head line and life line are the principal lines named as according to their position and thickness [8]. Compared to the features currently available, Palm print analysis is a relatively new biometric technology with many advantages of being most recognizable and stable [7, 8].

Landsteiner K discovered the blood group system in 1901 and until now 19 major groups are identified which vary in their distribution frequency among different races of mankind. The blood groups are categorized as A, B, O and AB blood groups by the corresponding plasma antigen. The Rhesus system can be classified by presence or absence of D antigen, Rh + and Rh^[9].

The blood group is another biological document which remains same throughout the entire life of an individual^[3].

It is noted that comparative studies of lip and palm prints are scarce in the literature and studies showing their association with ABO blood grouping are even rare^[3].

There are no studies available regarding these three parameters among the Coastal Karnataka Mangalore population. Therefore the present study was undertaken to investigate the correlation of lip prints, palm prints and ABO blood groups in both genders to identify individuals and to determine sexual dimorphism in the population.

Methodology

Selection of subjects/participants

100 subjects (50 males and 50 females) reporting to the Department of Oral Medicine and Radiology at A.B Shetty Memorial Institute of Dental Sciences, Mangalore between 18-25 years of age were recruited for the study.

Healthy subjects, who are willing to take part in the study and those blood group is known with a valid document were included in the study.

Subjects with permanent scars on palm or lips, subjects suffering from lip abnormalities (cleft lip), subjects having

hypersensitivity with lipsticks, subjects whose blood group not known without a valid document and subject who were not willing to take part in the study were excluded.

Method of collection of data

Detailed case sheet was recorded along with clinical examination of the oral cavity. The institutional ethical committee clearance was taken. Cheiloscopy examination, dermatoglyphics examination and blood group with a valid document was evaluated.

Method of collection of lip prints

Subjects were asked to sit comfortably on a chair and the procedure was carried out wearing sterile hand gloves and mouth masks. Application of a red coloured creamy lipstick was done uniformly on both the lips, starting from middle and moving laterally. The subjects were instructed to roll the lips inwards for even spread of lipstick. A new A4 sheet was used for collecting the lip prints. The paper was folded and the participants were asked to give the sample. Holding the oral fissure closed in the usual position of rest, portion of the A4 sheet was placed on the closed lips first dabbling in the middle and then pressing it comfortably to the corners of the lips. A strip of Cellophane tape was stuck on the A4 sheet to preserve the lip print. After recording the lip prints photographs were taken using high resolution digital camera. Lip prints were assessed according to Suzuki's and Tsuchihashi's Classification^[10] (Fig. 1) and the cheiloscopy procedure steps are shown in (Fig. 2A-D).

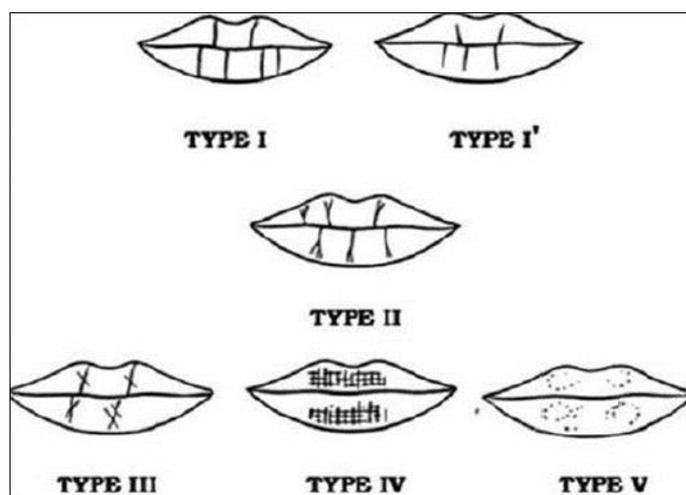


Fig 1: Categories of lip prints from Suzuki and Tsuchihashi (1970)^[10]



Fig 2A: Method of lipstick application, Fig 2B: Application of lipstick uniformly, Fig 2C: Obtaining lip print using A4 sheet pressing it on the corner of lips, Fig 2D: Picture showing the lip print record

Analysis of lip prints

The lip prints were divided into two quadrants at the midline and then, each quadrant was further divided into two equal parts as medial and lateral. Each segment was named according to the side they expressed as upper right lateral, upper right medial, upper left medial, upper left lateral, lower right lateral, lower right medial, lower left medial and lower left lateral [12].

The description used was that during the analysis of lip prints, the most dominant pattern was considered for the classification in each quadrant.

Method of collections of palm prints

2-3 drops of fingerprint ink were taken on glass slab and spread laterally by using the roller. The ink was directly placed on the palms of the subject with the help of a roller. The palm prints were obtained on the cylindrical bottle and the subject was asked to keep the wrist on the paper and asked to roll downwards. The impressions were obtained ensuring that all the fingers and the palmer creases touch the A4 paper. After recording the palm print photographs were taken using high-resolution digital camera. The Palm prints were assessed according to the Wu *et al.*, Classification [7] (Fig. 3). The steps of dermatlyphics procedure are given (Fig. 4 A-F).

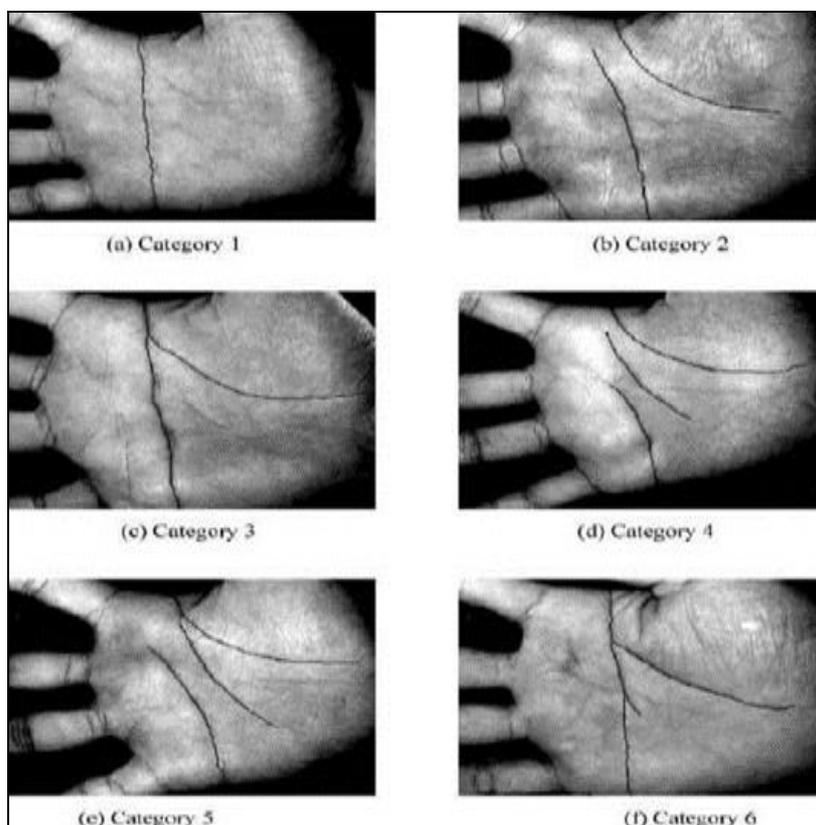


Fig 3: Classification of palm prints given by Wu *et al.*, (2004) [7]



Fig 4A: Spread both the palm, **Fig 4B:** Drop of ink placed on the slab spread laterally using the roller, **Fig 4C:** Spread ink on the palm with the help of roller analysis of palm prints, **Fig 4D:** Palm print obtained on cylindrical bottle, **Fig 4E:** Subject to apply wrist on the paper roll downwards, **Fig 4F:** Picture showing the palm print record

Analysis of palm prints

Palm prints were assessed according to Wu *et al.* Classification based on principal lines [7].

Palm prints shows skin pattern of a palm, consisting of several physical characteristics such as, texture, points and lines. The epidermis of the palm print may be thick as 0.8 mm compared to other parts of the body which are 0.07 to 0.12 mm thick. The epidermis progressively becomes thicker in response to continuous pressure and friction after birth. In general, Palm includes three creases for flexion. i) Permanent creases (main lines), (ii) secondary creases (wrinkles) and (iii) ridges. These three major flexions are genetically dependent.

Analysis of blood groups

The Blood groups of the subjects in the study were documented by using a valid report.

Statistical analysis

The data was presented as a chart using basic percentages, counts and Chi-square tests to check the association of variables. Level of significance was considered at $p < 0.001$.

The data obtained were analyzed by using SPSS version 22.

Results

The present study was undertaken to investigate the prevalence and association of lip prints, palm prints and ABO blood group between both genders to identify individuals and for determining sexual dimorphism in student population of Mangalore.

The most common lip pattern being Type II in both the genders and least common pattern is Type IV (Table 1, Fig. 5).

Table 1: Gender wise distribution of lip prints

Type of lip print	Lip print n (%)	
	Female	Male
I	15 (30)	11 (22)
II	34 (68)	35 (70)
III	0	0
IV	1 (2)	4 (8)
V	0	0

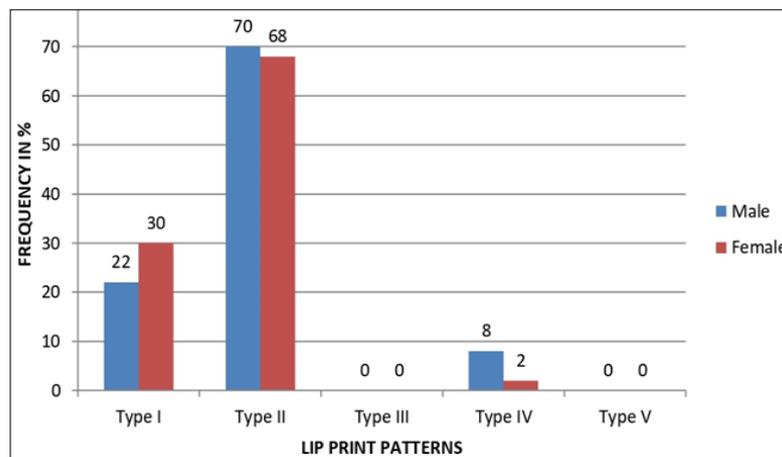


Fig 5: Graph showing category wise distribution of lip prints in both genders

In both the genders Category V was most common type in both right and left palm print patterns. The least common

pattern in right and left palm print was Category VI in females and Category III in males. (Table 2, Fig. 6 & 7).

Table 2: Gender wise distribution of palm prints

Category of palm print	Female		Male	
	Right palm print n (%)	Left palm print n (%)	Right palm print n (%)	Left palm print n (%)
I	NIL	NIL	NIL	NIL
II	NIL	NIL	NIL	NIL
III	NIL	NIL	4 (8)	3 (6)
IV	21 (42)	18 (36)	14 (28)	12 (24)
V	26 (52)	28 (56)	22 (44)	25 (50)
VI	3 (6)	4 (8)	10 (20)	10 (20)

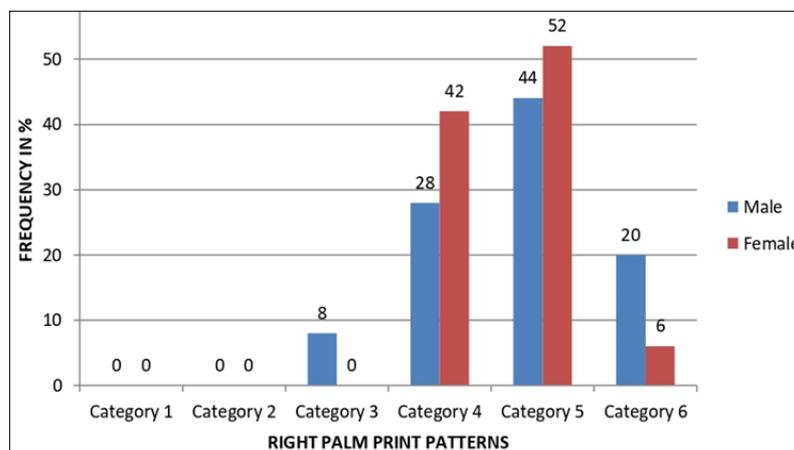


Fig 6: Graph showing category wise percentage distribution of right palm print in both genders

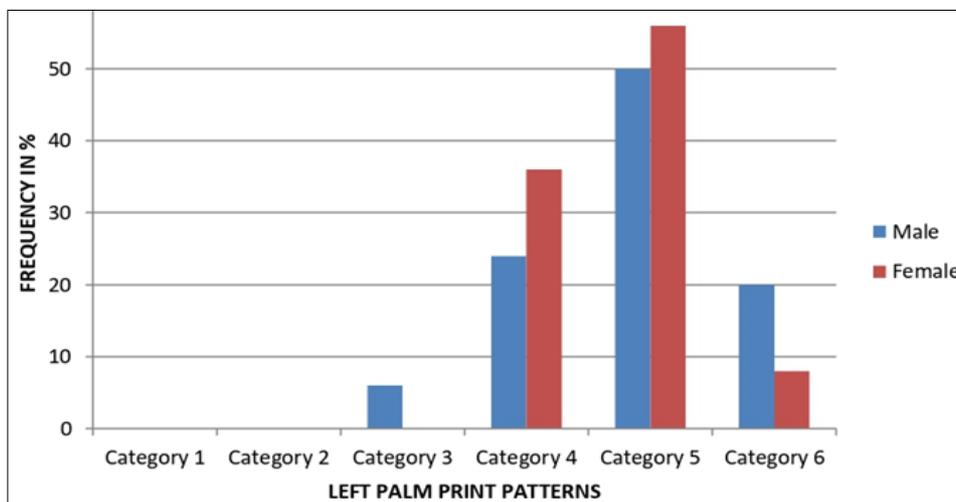


Fig 7: Graph showing category wise percentage distribution of left palm prints in both genders

The most common blood group was B+ among both the genders. The least common blood group in females was AB-, whereas in males least common blood group were A-, B-, AB- and AB+.

In males a positive correlation was found ($p < 0.001$) between the lip print and left palm prints and was statistically significant. (Table 4).

Table 3: Gender wise distribution blood groups

Blood group	Female	Male
A+	10 (20)	16 (32)
A-	2 (4)	1 (2)
B+	19 (38)	17 (34)
B-	2 (4)	1 (2)
O+	16 (32)	13 (26)
O-	NIL	NIL
AB+	NIL	1 (2)
AB-	1 (2)	1 (2)

Table 4: Pearson correlation between lip prints, palm prints and abo blood groups in different genders

Parameters	Female		Male	
	Pearson coefficient	p-value	Pearson coefficient	p-value
Lip print x Right Palm Print	-0.58	0.303	-0.57	0.308
Lip print x Left Palm Print	-0.57	0.317	0.987	<0.001
Lip print x ABO	-0.58	0.304	-0.53	0.355
Right Palm print x ABO	0.09	0.858	-0.13	0.795
Left Palm Print x ABO	0.15	0.773	-0.03	0.954

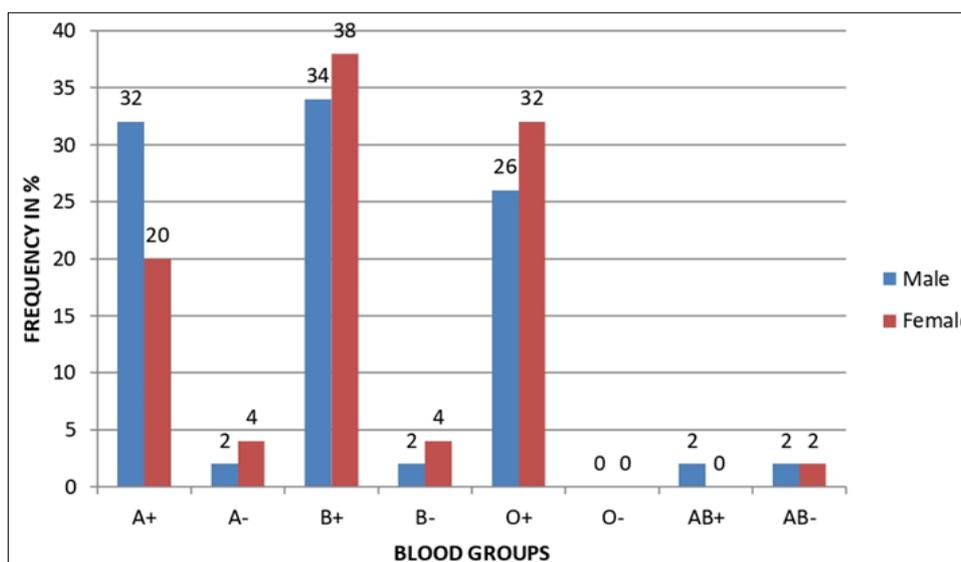


Fig 8: Graph showing category wise percentage distribution of blood group in both genders

In our study Category V left palm prints was correlated with Type II lip print pattern. There was no correlation with lip print and right palm prints.

There was a negative correlation between the lip prints and blood groups among both genders.

There was no correlation between palm prints and blood groups among both genders.

There was no statistically significant correlation between Lip prints, palm prints and blood groups among both genders.

Discussion

The use of various individual parameters such as cheiloscopy, dermatoglyphics, and blood groups play a vital role in personal identification. The main purpose of our study was to establish any significant association between lip prints, palm prints and blood groups among the student based population in Mangalore.

In our study, Type II lip print pattern was found to be predominant in males (70%) and females (68%). This is in accordance to the studies conducted by Verma P *et al.*, (2013)^[11] in Sriganagar.

Studies conducted by Gunasekaran S *et al.*,^[12] in Tiruchengode population also found Type II to be the most predominant pattern among Indian males, which is in accordance to our study, while they found Type I to be the most prevalent among Indian females which is in contrast to our study.

Dongarwar RG *et al.*,^[13] conducted a study in Wardha based population and found that Type I and I' were most common lip print patterns among females while Type IV and Type V lip print patterns were common in males.

Jain *et al.*,^[14] observed contrasting findings in Gujarati population which showed Type I' to be the most prevalent lip print pattern and the most uncommon pattern was Type IV. Gaba R *et al.*,^[15] showed that the lip prints patterns were unique to each individual, and varied between males and females.

In the present study Type II lip print pattern was predominant in Mangalore population and this variation can be attributed to the Ethnic, Racial and Geographical differences in the population.

In the present study, Category V palmprint was found to be the predominant pattern seen on right palm in males (44%) and females (52%) and Category V palm print was also found to be predominantly seen on left palm among both males (50%) and females (56%) which is in conformity to studies by Rekha V R *et al.*,^[16] among South Kerala population and Debta FM *et al.*,^[16] in Bhubaneswar Population.

In this study, in females the least common pattern seen on right and left palm was Category VI and among males the least common pattern seen on both right and left palm was Category III.

In the present study, B+ blood group was found to be predominant in females (38%) and males (34%) which is in accordance with the studies by Rashid S *et al.*,^[17] in Bundhelkhand population and Salmani D *et al.*,^[18] in Kerala population.

Studies done by Radhika R H *et al.*,^[19] and Viveki PR *et al.*,^[20] have found O+ blood group to be the most prevalent which is in contrast to our study.

In our study a positive correlation of lip print and left palm print in males was observed in Mangalore based student population. Rekha VR *et al.*,^[6] has reported that there was no significant association of lip prints and left palm prints in

South Kerala population. Debta FM *et al.*,^[16] have reported contrasting results with no significant association between lip prints and the left palm prints in Odisha population.

Our study results showed statistically significant p value ($p < 0.001$) where Type II lip print correlated with Category V left palm prints which could be associated to Genetic background and as the facial structures such as the lips, alveolus, and palate are formed from ectoderm during the embryonic stage (6 to 9 weeks).

In the present study there was no correlation with lip print and blood group in study population. Studies by Ashwinirani S R *et al.*,^[21] in the population of Kerala and Maharashtra observed no correlation between lip print and blood group.

Study by Karim B *et al.*,^[22] in Moradabad population and Verghese AJ *et al.*,^[23] in Kerala showed that there was no significant correlation between blood group and lip prints.

Verma P *et al.*,^[14] in Sriganagar conducted a study and observed that there was no association of lip prints with gender and blood group.

In our study there was no association between Palm prints and blood group.

Contrasting results were obtained in a study by Shivhare P R *et al.*,^[24] where there was a significant association between dermatoglyphics, gender, ABO, and Rh blood group.

Thus from the present study it can be stated that palm prints and blood groups can be only used independently to identify an individual.

In the present study no correlation was seen between lip prints, palm prints and blood groups among student population in Mangalore. Further it is noted that in the existing literature no studies are available which have tried to correlate between Lip prints, Palm prints and ABO Blood Group.

Conclusions

From our study, we conclude that the Type II was the most common and Type IV was the least common lip print pattern in both the genders. Category V was the common palm print pattern in the right and left palms of both the genders. The least common palm print pattern among females was category VI and in males Category III was least common palm print pattern. Blood group B + was most prevalent in both genders. Among males the less common blood groups were A -, B-, AB-and AB+. Among females the least common blood group was AB-. In both males and females, there was no correlation between lip prints, right and left palm prints and blood groups. However in males there was significant correlation between lip prints and left hand palm prints was observed.

Acknowledgement

None

Conflicts of interest statement

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

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