

# An Assessment of Inheritance Pattern and Gender Wise Distribution of Lip Prints Among Biological Families in Pakistan

Lip Prints  
Among Biological  
Families

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## ABSTRACT

**Objective:** To access the uniqueness of lip prints which aids in personal identification and sex determination and to ascertain whether there is any hereditary pattern in lip prints among families with siblings and biological babies.

**Study Design:** A descriptive study

**Place and Duration of Study:** This study was conducted at the Department of forensic medicine & toxicology, WM&DC, Abbottabad, and Holy family Hospital, Rawalpindi from January 2018 to June 2018.

**Materials and Methods:** A total of 216 individuals (father, mother, both children's), who underwent descriptive study of lip impression collection without any anesthesia or drug, were enrolled into the present study. Father, mother and both babies of each family were selected. Lip prints of Father, mother and both babies of each family were recorded. Each lip of 54 offspring's was compared with the corresponding lip of his/her father mother and other baby. The segments of each lip of the offspring's that matched/ resembled with either of father mother and biological babies were recorded.

**Results:** Out of 54-total families, biological babies of 19(35.18%) families observed resemblance with father, where as biological babies of 35(64.81%) families observed resemblance with mother. There was no definite identical lip print observed in any of the children. Furthermore, the prevalence of Type II lip prints was most higher type present in males and in females.

**Conclusion:** Lip prints of study participants did not match with each other, distinctive similar to finger prints it is considered feasible to apply lip prints features in personal identification.

**Key Words:** Cheloscopy, Lip prints, Personal identification, biological Family

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## INTRODUCTION

Identification by lip prints analysis is a less common applied procedure. Although it is very simple to be performed, less time consuming, easy to document, very much less expensive and no need of sophisticated machines requirements<sup>1,2</sup>.

Lip patterns can be identifying in intra uterine life of sixth week and by 9<sup>th</sup> week the formation of upper lip will be almost completed and remain unchanged for the rest of human life<sup>3,4,5</sup>.

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If a definite description of the lip print patterns of an individual is established by detailed study, this anti-mortem record of lip prints pattern can be used in postmortem records for personal identification, in sexual offences, in identification especially in cases of missing persons of biological family.

Presence of lip prints are irrefutable fact if the suspect has visited the crime site. If visited and consumed some drink or food stuff, touched some frame glass or used crockery, cloths etc then Lip print presence will provide relationship between suspect and crime scene. A detained record of individual lips can be used to match with lip prints on crime scene for identification of culprits.

The identification of misplaced persons can be very helpful in the practice of misery resolve of friends and family<sup>6</sup>. Individual Identification is a preliminary for death documentation and also for subjective, communal and legitimate motives<sup>7</sup>.

Keeping in view the importance of lip print patterns in personal identification, the present study was carried out to ascertain resemblance among the biological families involving babies, to determine the hereditary nature of lips.

## MATERIALS AND METHODS

This descriptive study was conducted at Department of forensic medicine & toxicology, women medical & dental college, Abbottabad and Holy family Hospital, Rawalpindi, from January 2018 to June 2018.

Non probability convenience sampling technique was used to collect sample. A total of 216 individuals, who underwent for collection of lips impression, were enrolled into the present study. The study was approved by the Ethical Committee of the women medical & dental college Abbottabad, and an informed consent was obtained from the father, mothers, children's (males & girls) /guardians of children. All participants were given brief details of our objectives and answered the questions relating to procedure. In the present study, a total of 216 father, mothers, children's (males & girls) were analyzed, which met the above sample size requirements.

**Inclusion criteria:** Only individuals having lips with normal transition zone of mucosa and skin were included in the study.

**Exclusion criteria:** Individuals were excluded from the study if they have: Inflammation of lips, malformation, deformity, surgical scars, and active lesions, Hypersensitive to impression material and No drugs or chemical was used in study subjects.

Individual's lips were cleaned and dried. A thin layer of lipstick was applied in a single motion evenly on the lips of each individual. After two minutes, the individuals were advised to maintain a relaxed lip position. Negligible pressure was sustained while making the lip impression and the glued portion of the cellophane tape fixed on to the white bond paper was used to make the lip impression. Lip prints on non-porous surfaces are better to be snapped and magnified so bond paper was preferred over tissue papers. This cellophane tape on bond paper served as a permanent record. The impressions were afterward visualized with the magnifying lens.

The upper and lower lips were divided through the mid-point by an imaginary horizontal line. A vertical imaginary line was drawn to divide lips into left and right upper and lower quadrants. The right upper quadrant was designated as first quadrant, the left upper as second quadrant, and the left lower as third quadrant, and right lower as fourth quadrant.

### Quadrants of lips

RIGHT UPPER LIP Quadrant 1	LEFT UPPER LIP Quadrant 2
RIGHT LOWER LIP Quadrant 4	LEFT LOWER LIP Quadrant 3

Each quadrant was analyzed from the center of the lip outward toward the corner of the lip and the various types of lip prints findings were recorded for each

quadrant. The lip prints obtained were given coded number and analyzed while keeping the identity of the respective individuals hidden.

Each individual of the family was numbered alphabetically as follows:

Sr.No.	Individual	Symbol
1	Father	A
2	Mother	B
3	First baby	C
4	Second baby	D

54 families were collected and 4 members per family including father, mother and biological babies. We have divided in to 5 pairs in which we studied;

Father verses 1<sup>st</sup> baby (AC)

Father verses 2<sup>nd</sup> baby (AD)

Mother verses 1<sup>st</sup> baby (BC)

Mother verses 2<sup>nd</sup> baby (BD)

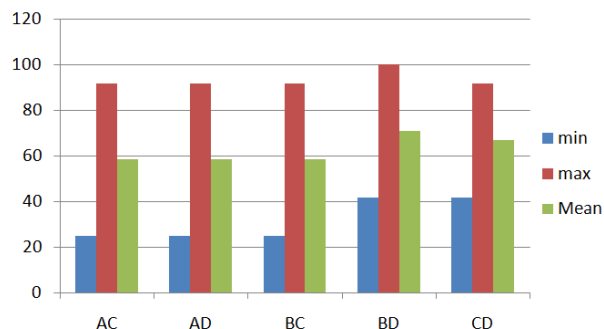
1<sup>st</sup> baby verses 2<sup>nd</sup> baby (CD)

The above mentioned data was recorded on predesigned performa and the lip print patterns were scrutinized in accordance of Suzuki and Tsuchihashi classification (Suzuki, K., Tsuchihashi, Y., 1970).

The data was entered and analyzed using SPSS 20.0 (Statistical Package for Social Sciences). Basic statistical techniques were used. Mean was calculated in all quadrants of individual lips. Frequency and percentages was calculated for resemblance among biological families and for gender. Z-test was applied to test the resemblance of lip prints to mother and father separately in the family. The data was represented in the form of tables and figures.

## RESULTS

The available data was used to generate the profile of resemblance of lip prints among various family members. The comparison was made between: father lip prints and both biological babies; mother lip prints and both biological babies; first biological baby and both parents; second biological baby and both parents, and then amongst biological babies.



**Figure No.1: Mean, Min, Max Resemblance of Parents and babies**

The mean resemblance between father and both biological baby was found to be 58.335 while between mother and first baby was as 58.335 and between

mother and second baby was as 70.835. The mean resemblance between first baby and second baby was found to be 58.335.

**Table No.1: Minimum and maximum resemblance in families**

resemblance	Father to 1 <sup>st</sup> baby	Father to 2 <sup>nd</sup> baby	Mother to 1 <sup>st</sup> baby	Mother to 2 <sup>nd</sup> baby	1 <sup>st</sup> baby to 2 <sup>nd</sup> baby
Min.	25 %	25 %	25 %	41.67 %	41.67 %
Max.	91.67 %	91.67 %	91.67 %	100 %	91.67 %
Mean	58.335 %	58.335 %	58.335 %	70.835 %	66.67 %
Average	58.335 %	58.335 %	58.335 %	70.835 %	66.67 %

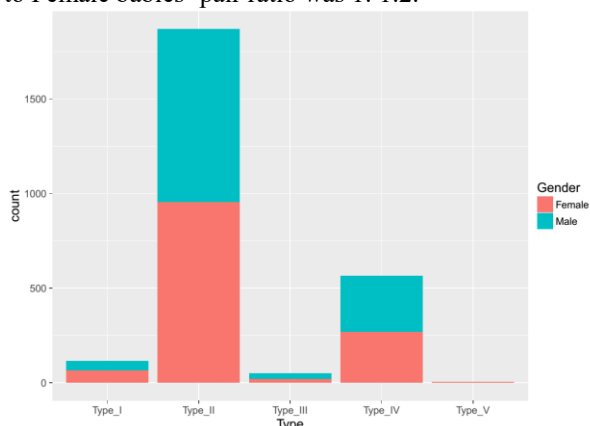
In all of 54 families, fathers resemblance with 1<sup>st</sup> and 2<sup>nd</sup> babies were calculated, and then mothers resemblance with 1<sup>st</sup> and 2<sup>nd</sup> babies was calculated. In 19(35.18%) families, off-springs found to be having higher resemblance with fathers ( $z=0.4978$ ,  $p<0.05$ ), whereas in 35(64.81%) families, children’s lip impressions showed higher resembling with mothers ( $z=0.49917$ ,  $p<0.05$ ). Lip prints showed a strong positive and statistically significant correlation between parents and their biological babies.

We observed that mother resemblance towards babies was at higher level as compared with father resemblance. Father to mother resemblance ratio is 1:1.8.

**Table No.2: Father to mother Resemblance ratio.**

Pairs of Family Members	Resemblance
Father vs. 1 <sup>st</sup> Baby (A-C)	62.50%
Father vs. 2 <sup>nd</sup> Baby (A-D)	62.65%
Mother vs. 1 <sup>st</sup> Baby (B-C)	69.13%
Mother vs. 2 <sup>nd</sup> Baby (B-D)	71.76%
1 <sup>st</sup> Baby vs. 2 <sup>nd</sup> Baby (C-D)	72.38%

Out of 54- families, 26 (51.85%) were male babies pairs while 28 (48.14%) were female babies pairs. Male to Female babies’ pair ratio was 1: 1.2.



**Figure No.2: Percent distribution of Types of Lip Prints in Male and Female**

Lip print types of all members of 54 families were studied. Type I, II, III and IV were found in both males and females. Type II was most common type present in males 913(70.8%) and in females 957(72.3%), while Type IV was second most common type in both males 296(22.9%) and in females 271(20.4%), followed by type II in males 49(3.8%) and in females 67(5.0%) and type III in males 30(2.3%) and in females 22(1.6%). Type V was least common in female 5(0.3%). None of the male has type V lip prints.

**Table No.3: Types of lipprints and frequency in study population**

Lip type	Male	%age	Female	%age	total	%age
Type 1	49	0.038043	67	0.050681	116	4.44
Type 2	913	0.708851	957	0.723903	1870	71.64
Type 3	30	0.023292	22	0.016641	52	1.99
Type 4	296	0.229814	271	0.204992	567	21.72
Type 5	0	0	5	0.003782	5	0.19
Total	1288	100%	1322	100%	2610	100%

The study samples included more males (106) as compared to females (110). Twenty six pair of male whereas twenty eight pair of female babies was included in the study. Male to female gender ratio was 1:1.02. In all the families father Maximum and Minimum Resemblance was 87.51% & 25% while mother Maximum and Minimum Resemblance was 91.67% & 33% respectively.

## DISCUSSION

The present study is a valuable addition to the available data of cheiloscopy on biological families. The study is unique with the largest data set of 54 different families having biological babies as compared to the previous studies and is first of its kind in Pakistan and in the world.

Study of lipprint analysis on biological babies has shown that lipprints are quite similar but not equal and relatives may have some degree of similarity concerning the predominant grooves pattern<sup>8</sup>.

There is no significant difference found in parents and biological babies. The resemblance of lip print pattern between father to biological babies ( $Z=0.4978$ ,  $P< 0.05$ ) and mother to biological babies ( $Z=0.49917$ ,  $P< 0.05$ ) was found to be statistically significant. Pattern of inheritance from father to biological babies and mother to biological babies was statistically significant. Two way ANOVA test showed a substantial variance in type of lip prints found in dissimilar families ( $p= 0.0001$ ). While no significant difference was observed between parents and biological babies. Overall the average

inheritance from father is 62.618 % and from mother is 70.49 %. Lipprints are not identical in case of identical twins but similarities of lip prints between parents and children's were found accounting for the hereditary to play a major role. This indicates that lip print patterns of biological babies shows a marked similarity with parents and can be used for comparison of lip prints within the family. These results are consistent with previous studies indicating significant level of similarities and genetic factor in biological babies<sup>9,10</sup>.

The most important feature of the current study is that the level of resemblance of parents with the biological babies is studied. When individuals were compared for resemblance among biological family, there was no significant difference in parents and off springs as revealed by Z-test ( $z=0.4978$  and  $z=0.49917$  for father and mother respectively) showing positive association with both parents. However, the findings of the study are consistent with the other study findings where they found no significant correlation with parents and biological babies.<sup>11</sup>

Our current study has recorded each and every line of entire lip starting from middle to periphery in each quadrant. Type II lip print pattern of both sexes in all of the 04-quadrants. In female study subjects, lipprint type II was most common finding which is consistent with the results of other observations<sup>12</sup>. Our studies also reveal that all the four quadrants of an individual's lip showed different types of patterns and in each single quadrant there were multiple patterns present. Hence we can confirm that no two lip prints match with each other and unique for individuals.

We observe that individuals don't have particular pattern in them in a particular quadrant of lip but that appeared to have a mixture of different patterns. It was found that they shared some similarity in the grooves but the detail features of lip prints were not same. We found that neither between the biological babies nor the biological babies with their parents had the similarity. Current study shares several features common with other published data in literature<sup>13-18</sup>. In the present study, lip prints of study participants did not match with each other. Thus, this finding validates that lip prints are distinctive similar to finger prints and thus have forensic significance.

Furthermore In the studied individuals, no two lips showed single type of lip print in whole of lip. Mostly mix type of lip prints were seen in all of biological children and their parents. In all families biological children shared features of lip print resemblance with father and mother that was found to have statistically significant association ( $p<0.05$ ). None of the biological child in any of the family showed complete lip print resemblance either with father or mother. All biological babies pairs were not absolutely identical but similar and their characteristic resembled either parents, which is similar to the studies performed on

children<sup>19,20,21</sup>. biological babies constitute a peculiarity inherent to cheiloscopy. Studies of lip prints on biological babies have shown that prints are quite similar but not equal and that relatives may have some degree of similarity concerning the predominant groove patterns, since lip prints seem to undergo strong influence by heredity.

The biggest limitation of the current study is that When the subjects press his or her lips, there is a possibility that only the central area of lip come in contact while the rest relaxed portion stay away of cellophane tape, which leads to distortion of the prints<sup>22,23,24</sup>.

## CONCLUSION

Based on the analysis in the current study, lip prints of studied biological families with biological babies participants did not match with each other. It is considered feasible to apply lipprints features in personal identification. Thus, this finding validates that lip prints are distinctive similar to finger prints and thus have forensic significance.

### Author's Contribution:

Concept & Design of Study:	Aftab Alam Tanoli, Qurrat Ul Ain
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Data Analysis:	Farrukh Iqbal, Atif Hussain
Revisiting Critically:	Naila Bangash, Muhammad Asif, Farrukh Iqbal
Final Approval of version:	Aftab Alam Tanoli, Qurrat Ul Ain

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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