ORIGINAL ARTICLE

Hereditary Resemblances of Lip Prints Among the Members of Biological Families

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ABSTRACT

Objective: To assess the resemblance of lip prints among the members of biological families, involving identical twins.

Study Design: Descriptive study.

Place and Duration of Study: Department of forensic medicine & toxicology, post-graduate medical institute/university of health sciences Lahore December 22, 2014, to December 22, 2016.

Materials and Methods: A total of 216 individuals (father, mother and both the children), who underwent observational study of lip impression collection without any anesthesia or drug, were enrolled into the present study. Father, mother and both identical twins of each family were selected. Lip prints of Father, mother and both twins of each family were recorded. Each lip of 54 twin offspring was compared with the corresponding lip of his/her father, mother, and other identical twin in the same family twin.

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

Conclusion: Lip prints of study participants do not match with each other. They are not identical with other twin baby or either parents but have some resemblance features. Like fingerprints, lip print patterns are unique, and it is considered feasible to apply lip prints features in personal identification.

Key Words: *Cheiloscopy; Lip Prints; Monozygotic Twins Family, Personal Identification.*

Introduction

Personal identification is necessary for unknown deceased person in homicide, suicide, accident, mass disaster etc. Identification of a missing individual can aid immensely in the process of grief resolution by family and friends. In universal declaration human rights, article 06 states that "before the law, it is the right of every person to be identified as individual person.[1] On human lips amongst the inner labial mucosa and external skin there is zone of transition on which lip patterns are present in the form of wrinkle and grooves in the form of normal lines and fissures. Like fingerprints, the pattern of wrinkles on the lips has individual characteristics. The wrinkles and grooves on the labial mucosa (called sulci labiorum) form a characteristic pattern called lip prints, the study of which is referred to as Cheiloscopy.[2]

Lip patterns can be identified as early as the sixth week of intra uterine life. After 6th week of fetal intra uterine life, lip prints are well developed and can be recognized. [3] The duration of lip print's reliability on paper may be up to 12 weeks even if exposed to ambient conditions, but duration of reliability on glass may be up to 9th week if kept in closed container in temperature adjusted around 25 °C, but if exposed to ambient conditions it may be up to 6th week. Clear and identifiable lip prints can be obtained if taken less than 24 hrs. after death[4].

A study was conducted on two matching twins in 1972 which stated that twins are indistinguishable by every other means, but their lip prints were diverse. Lip print analysis of family members suggest that

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offspring do receive similar type of lip prints features as of their mother / father, but location of these lines are different, and no two prints are the same even in twins.[5]

Development of modern techniques of crime detection has cautioned the criminals for taking sufficient precautions like the use of gloves. In such circumstances, accurate methods like fingerprint analysis fails to establish a positive identity. Any method that owns the probability of supporting the forensic field in identifying a dubious should be chased and if revealed applicable then it should be utilized for criminal investigations and legal proceedings. Crime detectors mostly don't utilize the benefits of using lip prints for the purpose of identifying the suspects. Detailed anti-mortem records of both lips can be used for matching the details of post-mortem lip prints for personal identification. A lip print established at the scene of crime can be a source for inferences as to the character of the cosmetics used, number of people involved, sex, habits, occupational traits and the diseased changes in lips themselves.[6]

Lip prints were recorded among 54 biological families with siblings involving identical twin, to ascertain inheritance resemblance of lip prints, and to analyze the characteristics of lip prints for positive identification, so that to make it an investigatory tool of identification in forensic sciences. The findings of these studies can be utilized to motivate crime scene investigators to analyze the characteristics of lip prints for positive identification as fingerprints in crime scenes, so that to make it an investigatory tool of identification in forensic sciences.

Materials and Methods

A descriptive study was conducted in the Department of forensic medicine & toxicology, post-graduate medical institute/university of health sciences Lahore from December 22, 2014, to December 22, 2016. A total of 216 individuals (father, mother, both children's), who underwent Non-Probability / Convenience Sampling of lip impression collection without any anesthesia or drug, were enrolled into the present study. Before starting the research work, I presented my proposal in institutional ethical review committee and advance studies and research board. Ethical review committee approved on 02-07-2014 and advance studies and research board approved on 05-07-2014. Only individuals having lips with normal transition zone of mucosa and skin were included in the study. Individuals having inflammation of lips, malformation, deformity, surgical scars, active lesions, and hypersensitive to impression material were not included in the study. No drugs or chemical was used in study subjects.

The subjects were residents of Abbottabad & Mansehra (KPK), Rawalpindi (Punjab) & Islamabad surrounding villages. Written informed consent was obtained. All participants were given brief details of our objectives and answered the questions relating to procedure.

A thin layer of lipstick was applied in a single motion evenly on the lips of everyone. After two minutes, the individuals were advised to maintain a relaxed lip position. Negligible pressure was sustained on lips touching cellophane tape the while making the lip impression and subsequently the glued portion of the cellophane tape fixed on to the white bond paper to retain the lip impression. The impressions were afterward visualized with the magnifying lens.

To minimize the chances of error, which could most likely occur with manual magnifying lens, a digital method (indirect method) was used to analyze the lip marking. The lip impressions were scanned and exported on adobe photoshop-7 software at 256 gray scales configuration. A 300-dpi resolution was used to enhance the imagining quality of lip prints.

Collected data values were recorded and analyzed using SPSS 20.0. P-value was taken as < 0.05. Confidence level was taken as 95%. Mean, standard deviation, minimum and maximum values were calculated for continuous variables in all quadrants of individual lips. Frequency and percentages were calculated for resemblance among biological families and for gender. Two-way Anova test applied for substantial variance in type of lip prints. Z-test was applied to test the resemblance of lip prints to mother and father separately in the family. Microsoft word and excel have been used to form tables and figures.

Results

The available data was used to generate the profile of resemblance of lip prints among various family members. The percentage of resemblance of lip prints of father and mother with their identical twins

and resemblance of 1st identical twin with 2nd identical twin with their father and mother in all of 54 families (216 individuals) are described in graph.

Fig. 1: Percent Resemblance of 54 Families

The X-axis shows family coded number.
The Y-axis shows resemblance among the families.
A-C corresponds to father verses first twin
A-D corresponds to father verses second twin
B-C corresponds to mother verses first twin
B-D corresponds to mother verses second twin
C-D corresponds to first twin verses second twin

Lip print pattern of all identical twin babies along with their parents were analyzed. Lip print type-1 was 116 (4.44%), Lip print type-2 was 1870 (71.6%), Lip print type-3 was 52 (1.99%), Lip print type-4 was 567 (21.7%) and Lip print type-5 was 05(0.19%) in all the quadrants of lips.

The mean resemblance between father and both twin was found to be 58.335 while between mother and first twin was as 58.335 and between mother and second twin was as 70.835. The mean

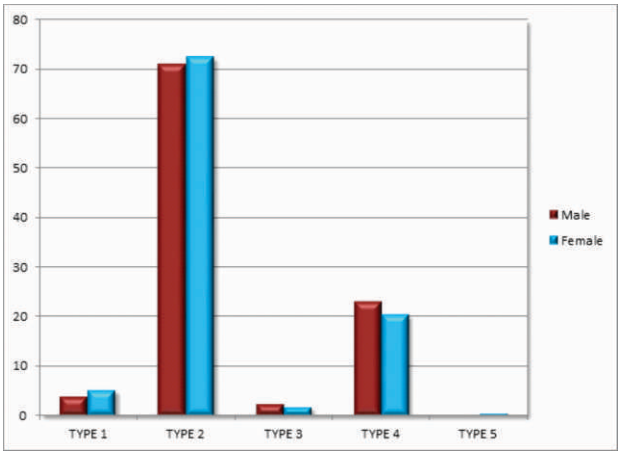

Fig. 2: Percent Distribution of Types of Lip Prints in Male and Female

Table I: Lip Prints Quadrant wise in Male Gender

Lip print types	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	total
Lip print type 1	12 (24.48 %)	10 (20.40 %)	11 (22.44 %)	16 (32.65 %)	49 (3.80 %)
Lip print type 2	205 (22.45 %)	220 (24.09 %)	259 28.36 %)	229 (25.08 %)	913 (70.88 %)
Lip print type 3	11 (36.66 %)	7 (23.33 %)	4 (13.33 %)	8 (26.66 %)	30 (2.32 %)
Lip print type 4	93 (31.41 %)	83 (28.04 %)	52 (17.56 %)	68 (22.97 %)	296 (22.98 %)
Lip print type 5	00	00	00	00	00

Table II: Lip Prints Quadrant Wise in Female Gender

Lip print types	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	total
Lip print type1	19 (28.35 %)	16 (23.88 %)	20 (29.85 %)	12 (17.91 %)	67 (5.08%)
Lip print type 2	202 (21.10%)	231 (24.13 %)	259 (27.06%)	265 (27.69%)	957 (72.66%)
lip print type 3	7 (31.81%)	7 (31.81 %)	4 (18.18%)	4 (18.18%)	22 (20.57%)
lip print type 4	102 (37.63%)	78 (28.78 %)	45 (16.60%)	46 (16.97 %)	271 (20.57%)
lip print type 5	00	00	2 (40 %)	3 (60 %)	5 (0.37 %)

resemblance between first twin and second twin was found to be 58.335. Maximum Resemblance of twin babies with father and mother was87.51% & 91.67% respectively, whereas minimum Resemblance of twin babies with father and mother 25% & 33% respectively

In 54 families, father resemblance with 1st and 2nd twin baby was calculated, and then mother resemblance with 1st and 2nd twin baby was calculated. In 19 families, off-springs found to be having higher resemblance with father 35.18% (z=0.4978, p<0.05), whereas in 35 families, children's lip impressions showed higher resembling with

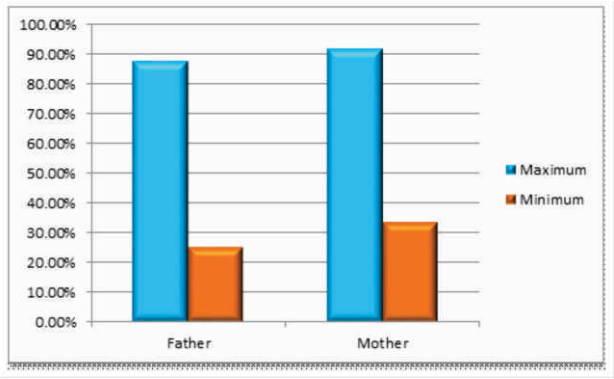

Fig. 3: Parents Maximum and Minimum Resemblance with Twins

mothers 64.81% (z=0.49917, p<0.05). Lip prints showed a strong positive and statistically significant correlation between parents and their offspring.

We observed that mother resemblance towards twin babies was at higher level as compared with father resemblance. Father to mother resemblance ratio is 1:1.8. No lip print pattern was found specific to any lip quadrant and mostly mix types of lip print pattern were present in all the 04- quadrants of lips. None of the gender had any specific lip print pattern in any specific lip quadrant.

Discussion

Our research study with 54-pairs of identical twin babies along with their mother and father in a family is unique and valuable addition on chelioscopic data. Lip prints are not identical in case of identical twins but similarities of lip prints between parents and children were found accounting for the hereditary to play a major role. Study on18-pairs of monozygotic twins and 22-pairs of monozygotic twins found that families with identical twin babies pointed to have a considerable genetic factor. Uni-ovular twins share same proteins, same genetic information so lip can be used as a primary biometric modality for successful identification purpose.[7]

Lip print pattern type II was the commonest finding in the study. In male and female gender participants lip print type II was 70.88% and 72.3%, lip print type IV was 22.9% and 20.4%, lip print type I was 3.8% and 5.06%, lip print type III was 2.32% and 1.66%, and lip print type V was 0.0% and 0.37%, respectively. In our study lip print type II was most common pattern in all the quadrants of lip in both males and females. The predominance of type II lip print is in accordance of the findings of a researcher, who studied 208 individuals and found type II (47.6%) as predominant lip print type.[8] The result finding of other research articles are also consistent with our data.[9,10,11] The findings of another study has also shown type II lip print pattern of both sexes in all of the 04-quadrents.[12] In female study subjects, lip print type II was most common dominant finding, which is consistent with the results of other findings.[13] Studies conducted by other organizers found that lip print type I was highest percentage in male and females subjects.[14,15] Lip prints show differences according to race and ethnic origins of persons. In contrast to our observation previous work demonstrated that lip print type II with (26%) was second most studied type in both sex.[16] Studies regarding prevalence of lip print pattern in different races or ethnic origin have been reported to show variations of pattern not only in population but also in male and female subjects.[17] Similarly the second most common type observed was lip print type IV which is in accordance to the previous studies.[18,19,20] but in contrast to the other studies where lip print type IV was most common type of lip prints.[6,5] Other lip print pattern observed in our research were lip print type IV, I, III and V respectively in prevalence which is in contrast to findings of other research where they found the succession of lip print as type III , IV, I and V.[21]

These findings are consistent with the study on 496 subjects and twins with families. No two identical lip prints were found in their study.[22] These findings are also like the study performed on 20-pairs of Monozygotic twins and 20-pairs of non-twin siblings.[23]

Overall, the results of the study are found to be consistent with the previous studies. Current study shares several features common with other published data in literature, where parents and monozygotic twins were studied, and it was found that they shared some similarity in the grooves, but the detail features of lip prints were not same. They found that neither between the twins nor the twins with their parents had the similarity.[24,25] Also lip prints were not identical in case of identical twins but the similarities of lip prints between parents and children were found accounting for the hereditary to play a major role. Identical twin babies had shown more percentage of similarities with each other in comparison to non-identical twins. Also, inheritance

pattern was significant for twin babies in case of their lip prints.[11] However, the findings of the study are inconsistent with the findings where they found no significant correlation with parents and twin offspring.[16] The most important feature of the current study is that the level of resemblance of parents with the offspring 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=0.499[17] for father and mother respectively) showing positive association with both parents. The finding is important as it could be used in forensic identification of missing persons in a family as phenotypic marker especially in cases of mass disaster.

Conclusion

Comparison of lip print pattern of identical twin babies shows that they are unique to each individual(father, mother, each twin baby) and among identical twin lip print patterns have some similarities with each other. They are not identical with other twin baby or either parents but have some resemblance features. There is no definite identical lip print pattern observation in any of the children. The prevalence of type-2 lip print is higher type, present in male and females of studied population. It concludes that lip print pattern is nonspecific indicator of gender determination.

Operational Definition

Resemblance

When off springs will receive at-least one same types of lip prints characteristic as their parents (either father or mother) in each quadrant of lip, but placement of lip prints characteristics may or may not be in the exact location as their either parents will be labeled as Resemblance.

Study Limitations

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. Identifying the biological family tree with identical twins is really hard work and time consuming. Family members especially fathers are mostly out of house due to business or job earning reasons and we must wait a lot and sometime travel a lot. Families are reluctant to participate voluntarily and concerned of giving their personal details and samples.

Ethical Approval

The ethical approval from Ethical Committee of post-graduate medical institute, Lahore was obtained prior to initiation of the research work.

Participants' Consent

The informed consents have been obtained from Volunteer individuals or guardians to publish the data concerning this case.

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Conflict of Interest

Authors declared no conflict of interest.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.