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KEY WORDS:

A STUDY ON ETHNO-RACIAL VARIATION OF LIP PRINTS

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ABSTRACT

Ethnic groups of population generating due to genetic heterogeneity possess intense challenge in the process of identification. The concept of individuality remains a strong point used in the analysis of fingerprints; likewise, the lip print of an individual is unique and hence holds possible for personal identification which could further assist in forensic investigation. The present study aims at determining the morphological patterns of lip prints in different races and evaluating the minutiae's and individual characteristics of lip print patterns in different races. Identification and estimation of most frequent type of lip print in some particular races is done. Out of 90 females selected for study (30 of each racial group) it was concluded that the most common lip print pattern among Caucasoid and Mongoloid was branched while in Negroid was intersected. The least common lip print pattern among Caucasoid was reticular, among Mongoloid was reticular and undetermined and among Negroid was undetermined. The frequency of branched type lip print was very high in Caucasoid and Mongoloid but frequency of intersected was high in Negroid.

INTRODUCTION:

A human mouth is a multitude pool of number of traces that is helpful in further forensic investigation. Science that is applied in personal identification from the oral and dental structure evidences is termed as forensic odontology. Labial mucosa of oral cavity forms wrinkles known as sulci labiorum that forms the lip prints pattern. [14] The study involved in examination of the lip prints is known as Cheiloscopy. Lip print patterns can be identified as early as the sixth week of the foetal stages. It has been found that secretions from the glands of the body like moisture leads to the formation of latent lip prints. Lip print pattern remains permanent and resistant during environmental changes. Factors such as climate, environment does not effect on lip print patterns. From the studies it has been found that the lip prints recover after undergoing alterations such as minor trauma, inflammation and herpes has effect on person individualization.

The first biological process of furrows and lines red part of human lips was determined in 1902. [15] Cheiloscopy has been used vitally ever since 1932 as an authenticated additive in forensic investigation as Edmund Locard suggested the use of lip print in personal identification in France [14] Suzuki and Tsuchihashi in 1970 were the first to classify various human lip patterns. [16]

Their classification are as follows:
Type 1: Clear cut vertical grooves run across the entire lip.
Type 1': Vertical grooves but do not cover the entire lip.
Type 2: Branched groove.
Type 3: Reticulate groove.
Type 4: Undetermined grooves

As every human being is different from one another, they show their own pattern of characteristics which is responsible for individualization of the person. Research educations and information regarding the use of lip patterns as evidence in personal identification and criminal inquiry in dentistry, while old age, are revealing. The traditional methods for personal identification including anthropometry, finger prints, sex determination, age estimation, measurement of height, differentiation by blood group, DNA and odontology. [1]

The lip prints pattern may vary from person to person that's why it comes under individual characteristics. From the studies it has also been found that the age of person also effects on the lip print pattern as the person of young age the grooves on the lips are clearly visible and the old age person these lip grooves are not clearly visible. Lip prints are unique and do not change during the life time of human being. Lip prints are the patterns which can easily visible and shown in the form of elevation and depressions.
Lip prints that may found on crime scene are of three types. These are: -

1. Visible lip print: coloured traces of lip prints that are visible by naked eye.

2. Persistent lip print: invisible traces of lip prints that can found on various surfaces which are recovered by using some agents like aluminium powder and magnetic powder.

3. Latent lip print: prints made by the secretion of oil and moisture from minor salivary glands, sebaceous glands and sweat glands present at edges of lips.

Lip prints are considered unique pattern and give the equally importance as the importance given to fingerprints. [2] Identification on the basis on fingerprint is very common as the fingerprints are always found at the crime scene but in the present time identification is also done with the help of lip print evidences. Now-a-days collection of lip prints are equally important as the collection of fingerprints in the crime scene. Lip prints identification and analysis are used in both criminal as well as civil cases. A lip prints at the crime scene can be a basis of conclusion as to conclude the number of people involved in crime, any cosmetics used, any type of crime committed. [3] Lip prints may have found in different crime scenes such as sexual assault, robbery, murder and child abuse.

Lip prints can be scientifically used by the measurements of biometric systems. Now a day's lip prints are also used for the privacy purpose in many software as that of fingerprints. After the advancement in forensic field, lip print study is newly technique that gives the better results after analysis. Just like fingerprints, lip prints are also use as an individual feature. Lip prints are used for the personal identification because it is also a unique feature as fingerprints. Lip prints also very helpful to conclude the presence of persons, gender and race of person involved in the crime. Also determined the shade, colour and brand of cosmetics used by the suspect and determined the type of crime committed. Many cases were solved on the basis of lip prints because lip print evidences are

also admissible in the court of law. Thus, lip prints are very important and useful technique in forensic world.

Collection of samples- Lip prints of 90 individuals were collected from different races. In this study, sample was collected from the 30 females of each race. The samples were collected from the females who had no disease and injury. Samples which were not clear were discarded. The data was obtained from subjects with fully normal lips, free from any skin disease and pathology.

Methodology: The materials used in this study was lipstick of bright colours like red, brown, maroon, white sheet paper, pencil for labelling the individuals details, magnifying lens. Lip prints of 90 individuals were collected from different race, samples were collected from the 30 females of each race.

Lips of all the subjects were cleaned and the dark coloured lip stick was applied with a single stroke evenly on the lips. The subjects, asked to rub both the lips to evenly spread the applied lip stick. Over the lip stick, the white sheet paper was placed and the subjects were asked to make a lip impression in the normal rest position of the lips by dabbing in the centre first and then pressing it uniformly towards the corner of the lips. The lip prints obtained were recorded, along with the name, gender, age and race of the respective individuals.

In this study the comparison of lip print pattern was done on the basis of classification system of lip print pattern was done on the basis of classification system of lip pattern proposed by Suzuki and Tsuchihashi,

Type 1: Clear cut vertical grooves run across the entire lip.
Type 1': Vertical grooves but do not cover the entire lip.
Type 2: Branched grooves
Type 3: Reticulate grooves
Type 4: Undetermined grooves

Result and Discussion:
As seen in table-1, the most common lip print pattern was Type 2 (Branched patterns—86.6%) and the least common pattern was Type 4 (Reticular—10%). Type 5 (Undetermined—20%) was common in Caucasoid. Graph-1 showed the high frequency of Type 2 (Branched) lip print patterns in our present study which contrasts with previous results that was conducted by Verghese et. al. (2010) who determined the lip prints among Kerala population and found that Type 4 (reticular) was the most common pattern of lip prints among Kerala population [4]. In the present study, frequency of reticular type of pattern was very low among Caucasoid. As seen in table-2 Maximum minutiae's seen in Caucasoid are dot (93%), hook (90%), simple bottom bifurcation (93%), simple top bifurcation (93%), and crossing line (90%). Gupta S et. al. (2011) studied the morphological patterns of lip prints in the North Indian population. In their study they observed the most prominent pattern among females was Type 3 (intersected) and in males the most prominent pattern of lip print was Type 2 (branched). In their overall study Type 4 (reticular) type of lip print pattern was least common [5] which were also least common pattern in Caucasoid.v Kaul R et. al. (2017) in which they compared the lip prints in ethno-racial groups in India. They observed among all the ethno-racial groups, Type 1 (complete) was the most prevalent lip print pattern and Type 4 (reticular) was the least prevalent among all the ethno-racial group [6] which also corelated with the results of Caucasoid group in present study.

In Mongoloid, Type 2 (Branched patterns—80%) was the most common lip print patterns whereas Haikal et. al. (2015) compared Arab and Chinese ethnic on the basis of lip print pattern and then they found that the frequency of Type 1' (Partially straight) pattern was predominant in Arab and Type 1 (Complete) in Chinese population [7]. In present study, Type 1' (Partial straight groove—76.6%) came after branched patterns. The least common lip print patterns were Type 4 (Reticular—20%) and Type 5 (Undetermined—20%) as compared to previous study by Prasad et. al. (2011) on Aryan-Dravidian and Mongoloid groups [8]. In that study, they observed that Type 3 (Intersected) was found to be most prevalent lip print patterns in both males and females. Type 4 (Reticular) was least prevalent lip print pattern in males whereas in females Type 1' (Partial straight grooves) was the least prevalent lip print patterns. Graph-1 showed very high frequency of branched type of lip print pattern and then the frequency of partial straight groove was also high. The frequency of reticular and undetermined type of pattern was very low as compare to other types among Mongoloid. Maximum minutiae's which was seen in Mongoloid- dot (90%), simple bottom bifurcation (90%), and crossing line (90%) [as shown in table-2]. This study also corelate with the study of Nagpal B et.al. (2015) compared lip prints among Indian and Malaysian Students which revealed that Type 1 (Complete) was most common lip prints patterns found 42.7% in Indians and 56.1% in Malaysian students [9].

After the analysis of samples of Negroid, it was found that the most common type of lip print pattern was Type 3 (Intersected—80%) and the least common type of pattern was Type 5 (Undetermined—10%) as compared to previous study by Adamu LH et. al. (2012) on the relationship of thumb prints and lip prints among Nigerians showed Type 5 (Undetermined) was the predominant and the least was Type 1' (Partially straight grooves) [10]. Graph-1 showed the frequency of intersected grooves was very high and then branched type also high. The frequency of undetermined type was very low among Negroid. Maximum minutiae's present in Negroid was dot (96.6%) and crossing line (93%) [as seen in table-2]. This present study compared with previous study by Visveswaraiah PM et.al. (2014) who compared the lip print patterns in South Indians and Iranian populations, in which they observed Type 3 (Intersected-34%) pattern was the most common in South Indians whereas Iranians showed more Type 1 (complete-38%) [11]. Edibamode EI et. al. (2013) conduct a study on lip print pattern among students of the University of Port Harcourt, Nigeria. Their study revealed that Type 2 (Branched) pattern was most common in both males (33.6%) and in females (26.0%) whereas Type 1' was the least common in both sexes (5.3% in males and 5.6% in females) [12].

The results of minutiae observed in lip print subjects of different races have been assessed (table 2). The pioneer of Chieloscopy, Professor J Kasprzak, analysed 23 unique patterns for finding features of human beings. Such patterns (lines, bifurcations, bridges, pentagons, dots, lakes, crossing lines, triangles) are very similar to fingerprint, iris or palm print patterns. The statistical characteristics features extracted from the lip print also account for unique identification. The previous study was conducted by Kaur R et.al. (2017) on lip print pattern recognition in Baniyas population of Haryana in which 10 individual characteristics like eye, hook, bridge, line, dot, rectangle like, group of dots, simple top bifurcation, simple bottom bifurcation and crossing lines were observed. This study revealed that line was the most common and rectangle like was the least common minutiae found in Baniyas population of Haryana [13].

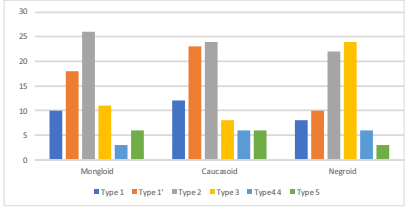
Table:1 showing the percentage of patterns observed among different ethnic groups.

S. No.	Type of Patterns	Number of patterns (in %) in Caucasoid	Number of patterns (in %) in Mongoloid	Number of patterns (in %) in Negroid
1.	Complete straight grooves	33.3%	40%	26.6%
2.	Partial straight grooves	60%	76.6%	33.3%
3.	Branched grooves	86%	80%	73.3%
4.	Intersected grooves	36%	26%	80%
5.	Reticular grooves	10%	20%	20%
6.	Undetermined grooves	20%	20%	10%

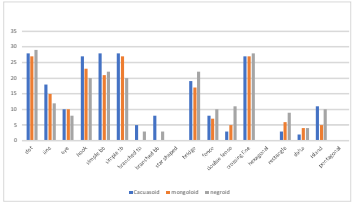
Table:2 showing the percentage of minutiae observed among different ethnic Groups.

S. No.	Type of minutiae's	Numbers of minutiae's in Caucasoid (in %)	Numbers of minutiae's in Mongoloid (in %)	Numbers of minutiae's in Negroid (in %)
1.	Dot	93%	90%	96.6%
2.	Line	60%	50%	40%
3.	Eye	33.3%	33.3%	26.6%
4.	Hook	90%	76.6%	66.6%
5.	Simple bottom bifurcation	93%	70%	73.3%
6.	Simple top bifurcation	93%	90%	66.6%
7.	Branched top bifurcation	16.6%	0%	30%
8.	Branched bottom bifurcation	26.6%	0%	30%
9.	Star shaped	0%	0%	0%
10.	Bridge	23.3%	56.6%	73.33%
11.	Fence	26.6%	23.3%	33.3%
12.	Double fence	10%	16.6%	36.6%
13.	Crossing line	90%	90%	93%
14.	Hexagonal	0%	0%	0%
15.	Rectangle	10%	20%	30%
16.	Delta	6.66%	13.3%	13.3%
17.	Island	36.6%	16.6%	33.3%
18.	Pentagonal	0%	0%	0%

Graph 1: showing the frequency of lip prints among different races.



Graph 2: showing the frequency of minutiae among different races.



Conclusion:

In present study lip prints show various patterns among different races. The most common lip print pattern among Caucasoid and Mongoloid was branched and least common lip print pattern among Caucasoid was reticular and among Mongoloid was reticular and undetermined. The most common pattern in Negroid was intersected and least common was undetermined. The frequency of branched type lip print was very high in Caucasoid and Mongoloid but frequency of intersected was high in Negroid.

The current study was done on a limited sample size to establish differences in the lip print patterns among different races with the help of lip stick. Samples were analysed with hand lens by dividing the print into four segments. This study shows that all the four quadrants. The result of this comparative study has shown that lip prints are unique as the fingerprints and remain same in the entire life of human being.

REFERENCES:

1. Shangnessy PE. Introduction to forensic science. Dent Clin North Am. 2001; 45:217-227.
2. Sivapathasundharam B, Ajay Parkash P, Sivakumar G. Lip Prints (Cheiloscopy). Indian J Dent Res. 2011.
3. Singh H, Chhikara P, Singhore R. Lip Prints as evidence. J Punjab Acad Forensic Med Toxicol. 2011.
4. Verghese AJ, Somasekar M, Umesh BR. Study on lip print types among the people of Kerala. J Indian Acad Forensic Med. 2010; 32:6-7.
5. Gupta S, Gupta K, Gupta OP. Study of morphological patterns of lip prints in relation to gender of North Indian Population. 2011; 1(1):12-16.
6. Kaul R, PS Shilpa, S Padmashree, Bhat S, Sultana N. Study of lip print in different ethno-racial groups in India. Indian J of Dent Research. 2017; 28:5:545-548.
7. Haikal, Muhammad and Chairani, Shanty and Dewi, Siti RP. Determination of lip print patterns among Arab and Chinese Ethnic. 2015:978-979-8182-52-5.
8. Parasad P and Vanishree. Comparison of lip prints between Aryans-Dravidians and Mongols. Indian J of Dent Research. 2011; 22:5:664-668.
9. Nagpal B, Hegde U, Sreehya HS, M Arun. Comparative evalution of lip prints among Indian and Malaysian Students. 2015; 37:2.
10. Adamu LH, Tauro MG, Hamman WO, Ojo SA, Dahine AU, Sadeeq AA, Ibrahim AD. Association of lip print and sex among Nigerians. Nigerian J of Basic and Clinical Sciences. 2012; 9:2:79-83.
11. Visueswaraiah PM, Johnson S, Kasim K, Laitha MK. Variation of lip print patterns in South Indians and Iranian Populations-Does it aid in personal identification? Int J Cont Med Res. 2014 ;1(2):21-26.
12. Edibamoda EI, Udoaka, Okoh PD, Uzoaru JA. Lip print pattern among students of the University of Port Harcourt, Nigeria. African Journals Online. 2013; 12:2.
13. Kaur R, Goswami M, Kaur KJ. Lip print pattern recognition in Baniyas Population of State of Haryana. Int J of Advanced Research in Engineering and Applied Sci. 2017; 6:12.
14. Saraswathi TR, Mishra G, Ranganathan K. Study of Lip Prints. J Forensic Dent Sci 2009;1:28-31.
15. Kasprzak J. Possibilities of cheiloscopy. Forensic Sci Int. 1990;46:145–51.
16. K. Suzuki, Y. TsuchihashiNew attempt of personal identification by means of lip print J Indian Dent Assoc., 42 (1970), pp. 8-9