

## **AN ASSESSMENT OF INHERITANCE PATTERN OF LIP PRINTS IN NATIONAL CAPITAL RANGE POPULATION**

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### **ABSTRACT**

**Aims and Objectives-** Lip prints are normal lines and fissures in the form of wrinkles and grooves present on the lips. They are unique to each person but basic lip prints patterns could still have similarities within the family. If established that there is a hereditary pattern in lip prints patterns, they can be an important tool in personal identification and determining familial lineage of a person. Therefore, present study was carried out to ascertain whether lip prints of mother match with their corresponding children. **Methodology-** The subjects for the investigation included 60 individuals of 30 families from NCR population. Mother and a daughter or son of each family was selected and the lip patterns of the 30 offspring were compared with the corresponding lip patterns of his or her mother. The lip prints were analyzed using magnifying lens and were classified using the criteria given by Suzuki and Tsuchihashi. The results were subjected to statistical analysis. **Results-** Hereditary resemblance was observed between mother and offspring in 17 out of 30 cases. Lip print types I, II & III among mothers were significantly more inherited by their children while lip print type IV & V were not inherited significantly (the level of significance was set at  $p < 0.05$ ). **Conclusions-** The result indicates the role of heredity in lip patterns. This can be an aid for narrowing down investigations and also a basis for genetic and inheritance implications.

**Key Words:** Cheiloscopy, Inheritance, Grooves, Lip prints

## **Introduction:**

As Forensic odontology, or forensic dentistry, was defined by Keiser Neilson in 1970 as "a branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings"<sup>1</sup>

The external surface of the lip has many elevations and depressions forming a characteristic pattern called lip prints, which are unique to an individual like finger prints.<sup>3</sup> Lip prints are similar to fingerprints, palm prints and footprints in that it is an individual characteristic.<sup>2</sup> For a long time forensics have been using Fingerprints, DNA and Retina Pattern for identification of a person. With advancement in technology many innovations have come across for the help of forensics.<sup>3</sup>

Human identification from the study of their biometrics has gained much popularity in recent times. In these approaches human beings can be identified based on their physical traits without the aid of any external key. Several methods are used for human identification such as face, iris, retina, finger veins, skin, finger-nails recognition, palm vein, etc.<sup>4</sup>

Personal identification is becoming increasingly important not only in legal medicine but also in criminal investigation, identification and Genetic Research. A wide

range of methods are available for this purpose out of which, the best and most often used is fingerprints. An alternative method of identification is cheiloscopy. These grooves occur as distinct patterns or types and are unique to each individual and thus can be used to fix the identity of a person.<sup>5</sup> Sometimes lip print can be a basis for crime detection. It is used to find the situation on the basis of evidence surrounding the crime spot for identifying number of people involved, their nature, sex as well as type of crime held during the event.<sup>4</sup> This present study was carried out to ascertain whether lip prints of mother match with their corresponding children.

## **Materials and Method:**

Subjects for the investigation included 60 individuals of 30 families Mother and Son/Daughter of National Capital Range Population were taken. Written informed consent was taken from each subjects, In case of minor subject consent was taken from parent.

Following materials were used in recording lip prints.

- Red colored lipsticks and lipstick brushes.
- A cellophane tape.
- White colored bond papers.
- A magnifying lens
- A scissor, pencil, cotton
- Gloves, a wall mirror.

### **Criteria for sample selection:**

The criteria for sample selection were subjects with no congenital facial defects, no lesions on the lips and no known hypersensitivity. The lip prints were analyzed using magnifying lens and were classified using the criteria given by Suzuki and Tsuchihashi, as follows:<sup>2</sup>

Type I: Clear-cut vertical grooves that run across the entire lips.

Type I': Similar to type I, but do not cover the entire lip.

Type II: Branched grooves (branching Y-shaped pattern).

Type III: Intersected grooves. Criss-cross pattern, reticular grooves.

Type IV: Reticular grooves.

Type V: Grooves do not fall into any of the type I-IV and cannot be differentiated morphologically. (Undetermined).

### **Method:**

Subjects were asked to sit at relaxed position on a dental chair, their lips were cleaned with wet cotton, red colored lipstick was applied on the lips with the lip brush, subjects were asked to rub both their lips to spread uniform application of lipstick, glued portion of the cellophane tape strip was placed and a lip impression was made by dabbing it in the center first and then slowly moving towards the corners of the lips, Cellophane tape strip with lip impression

was placed on a white A-4 sheet where the lip impression were analyzed with the help of a magnifying glass.

### **Results:**

Type I pattern was found to be 100% inherited by the respective children (n=03). Significantly higher proportion (66.7%) of Type II lip pattern among mothers were inherited by their children. Significantly higher proportion (71.4%) of Type III lip pattern among mothers were inherited by their children. Significantly lower proportion (14.3%) of Type IV lip pattern among mothers were inherited by their children. There was only 1 mother having Type V lip pattern which was not inherited by her child. (Graph 1)

Lip print types I, II & III among mothers were significantly more inherited by their children while lip print type IV & V were not inherited significantly. (Table 1, Graph 2)

Lip print types I, II & III among mothers were significantly more inherited by their children while lip print type IV & V were not inherited significantly.

**Fig 1 - Child**



**Fig 2 – Child Lip Print**



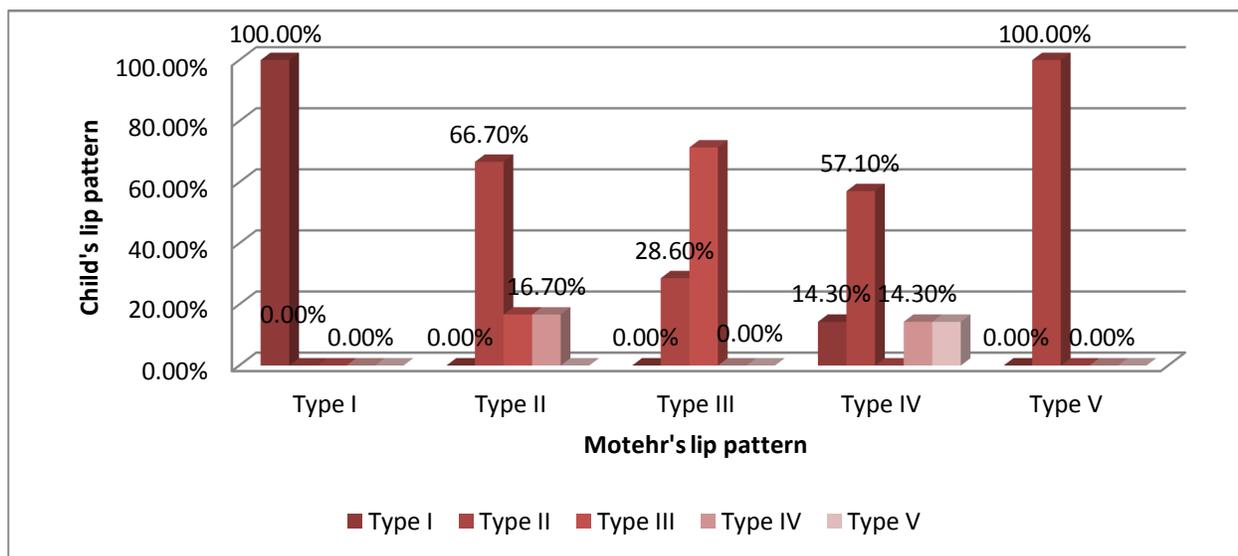
**Fig 4 – Mother Lip Print**



**Fig 3 – Mother**



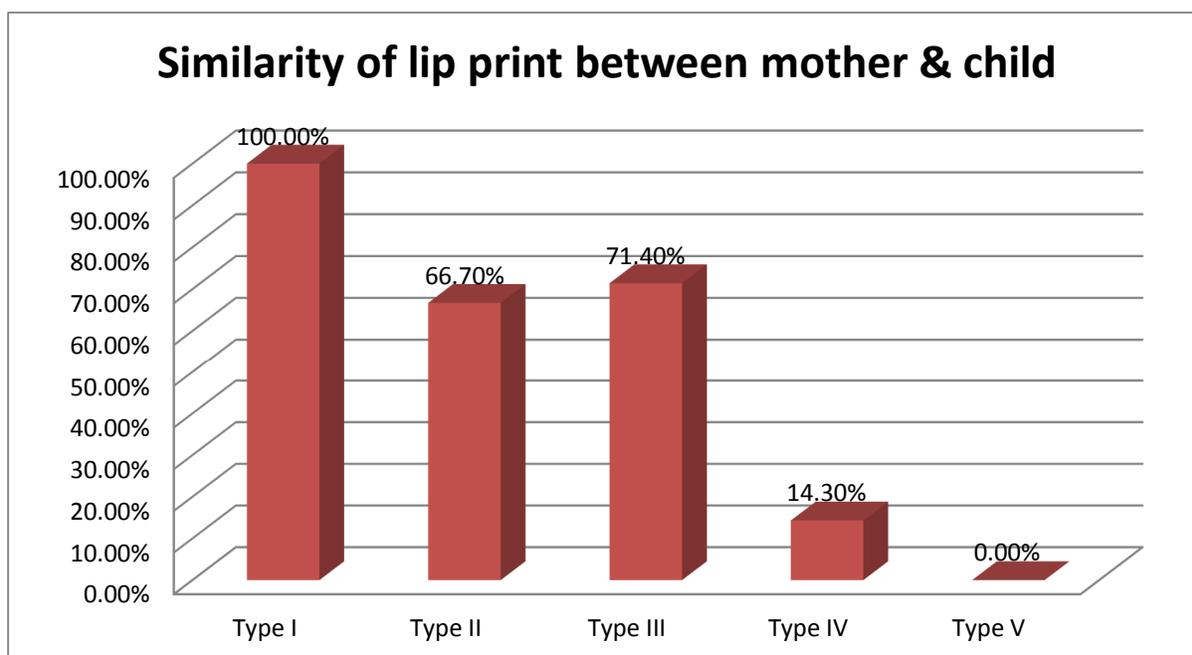
**Graph 1: Inheritance patterns of lip prints among the study groups**



**Table 1: Statistical significance of inherited lip patterns**

Pattern of Lip Print			Similarity of lip print between mother & child		Total
			Not present	Present	
Type I	N	0	3	3	
	%	0.0%	100.0%	100.0%	
Type II	N	4	8	12	
	%	33.3%	66.7%	100.0%	
Type III	N	2	5	7	
	%	28.6%	71.4%	100.0%	
Type IV	n	6	1	7	
	%	85.7%	14.3%	100.0%	
Type V	n	1	0	1	
	%	100.0%	0.0%	100.0%	
Total		n	13	17	30
		%	43.3%	56.7%	100.0%
Chi square value			9.832		
P value			0.043, S		

**Graph 2: Similarity of lip prints between mother and children.**



## Discussion

Every human is distinct and unique in the pattern of characteristics they exhibit. Lip prints are lines and fissures that appear as wrinkles and grooves in the zone of transition between the inner labial mucosa and the outer skin of human lip. The examination of these fissures is referred to as cheiloscropy.<sup>6</sup>

Forensic science is defined as the application of scientific methods and techniques to matters under investigation by a court of law. Forensic science in a broad sense deals with criminal investigations by identification of the body, cause, and manner of death, etc. Identification of gender of an individual plays a significant role in the forensic investigation. Dental, fingerprint and DNA comparisons are probably the most common techniques used in this context, allowing fast and secure identification processes. However, in certain circumstances related to the scene of the crime, these techniques might be unavailable, so there is still an increasing need for reliable alternative methods of establishing gender.<sup>7</sup>

Ranjan V, Sunil MK, Kumar R founded in their study on lip groove patterns in all the quadrants of both male and female subjects to identify the sex,

based on the patterns of the grooves of the lip prints. The lips can be horizontal, elevated, or depressed, and according to their thickness, it is possible to identify the following four groups: 1. Thin lips (common in the European Caucasian), 2. Medium lips (from 8 to 10 mm is the most common type), 3. Thick or very thick lip (usually having an inversion of the lip cord and is usually seen in negroes), 4. Mix lips (usually seen in Orientals).<sup>1</sup>

Saxena S, Sharma P, Gupta N stated that Forensic odontology has played a key role in identification of persons in mass disasters (aviation, earthquakes, Tsunamis), in crime investigations, in ethnic studies, and in identification of decomposed and disfigured bodies like that of drowned persons, fire victims, and victims of motor vehicle accidents. The various methods employed in forensic odontology include tooth prints, radiographs, photographic study, rugoscopy, cheiloscropy and molecular methods.<sup>9</sup>

Vignesh R, Rekha CV, Annamalai S, Norouzi P, Sharmin D conducted a study on Cheiloscopic patterns where, lip patterns were analyzed for skeletal malocclusions, but the literature search shows no studies relating to terminal planes in primary dentition. This study is an initial attempt to relate them as the terminal plane of the primary second molars plays a significant

role in determining the occlusion of the permanent dentition.<sup>6</sup>

Ghalaut P, Bhagwath S, Saxena S, also conducted a study where study was carried out to ascertain whether there is any hereditary pattern in lip prints patterns between parents and offspring's and their study showed Both mother and father showed strong positive & significant correlation between parents and their offspring's indicating that lip print patterns do have a family linkage.<sup>2</sup>

Research studies and information regarding the use of lip prints as evidence in personal identification and criminal investigation in forensic dentistry is very much scanty. In spite of few studies available, the study of Tsuchihashi gives a standard classification of his own for different types of lip prints. We kept this classification as the basis, of the current study. To study the lip print patterns indicating that there might be an inheritance pattern for lip prints from parents to offspring's. A strong inheritance phenomenon of lip patterns has also been proved by studies of Hirth et al (1975) and Schnuth et al (1992), who founded that heredity plays an important role in lip print development.

#### **Conclusion:**

The present study depicted that there persists a similarity of lip print patterns

among mothers and their offsprings. A detailed analysis of different aspects of lip prints should be done. Complete utilization of this evidence can be achieved by standardizing the methods and opining the minimum matching points required, Extensive chemical methods and sophisticated software tools should be developed. Besides all this, the anthropological aspects of lip print patterns should be practiced, which can enable narrowing down of the investigation process.

**Conflict of interest:** None

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