

## Original Article

## Cheiloscopy: A Study of Morphological patterns of Lip Prints in Rajasthani population

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### ABSTRACT

**Background:** Many elevations and depressions found on the external surface of the lip forming a characteristic pattern are called lip prints, the examination of which is referred to as cheiloscopy.

**Aim:** To determine the predominant lip print pattern in Rajasthani population of the Indian subcontinent.

**Materials and Methods:** 201 subjects of Rajasthani including 107 males and 94 females who met the inclusion criteria were included in the study and after application of a dark colored lipstick and impressions of the lips were taken on the self adhesive cellophane tape which were subsequently transferred onto bond sheets for analysis of lip prints patterns.

**Results:** results of this study showed that most prevalent pattern in Rajasthani population was found to be type IV, followed by type I, type V, type III, type I' and type II being the least prevalent. Statistical analysis with chi square test revealed no statistically significant differences were found among male and female subjects in their prevalence.

**Conclusion:** The most prevalent lip print pattern in Rajasthani population was found to be type IV, followed by type I, type V, type III, type I' and type II being the least prevalent with no statistically significant gender differences. Further studies with large population groups will help in providing the practical applications of this identification method.

**Key words:** Cheiloscopy, Lip Prints Patterns, Prevalence, Rajasthani population.

### INTRODUCTION

Human identification is a universal process based on scientific principles [1]. The methods employed in the personal identification include anthropology, dactylogy, DNA finger printing and blood groups [1]. Every human being has their own and unique characteristics. External surface of the lip has many elevations and depressions forming a characteristic pattern called lip prints, examination of which is referred to as cheiloscopy [2].

The biological phenomenon of systems of furrows on the red part of lips was first described by anthropologist Fischer 1902 [3]. Use of lip prints was first recommended by Edmond Locard in 1932. In

1961, the first study on the lip prints was carried out in Hungary by Dr. Martin Santos. At this time the usefulness of lip prints in criminalistic investigation had been proven. In 1971, Kajuo Suzuki and Yasuo Tsuchihashi, two Japanese carried out more investigation in their studies which was further confirmed by Tsuchihashi in his longitudinal study regarding heredity of lip prints [3]. Several studies were carried out by researchers from India or other countries focusing on different aspects of the lip prints, such as stability, sex determination, and various morphological patterns among different population groups. Previous studies have revealed that lip print patterns show differences according to the race and ethnic origins of a person [4].

**AIMS AND OBJECTIVES**

This study was undertaken to determine the predominant lip print pattern in Rajasthani population of the Indian subcontinent.

**MATERIALS AND METHODS**

This study was carried out on 201 students of NIMS dental college. They belonged to Rajasthani population (natives of Rajasthan or born in Rajasthan), including 107 males and 94 females. The age range of students included was from 18-25 years. All the subjects were explained about the purpose of the study and a written consent was taken from each individual prior to the study. Ethical committee clearance was also obtained. The criteria for exclusion, included: presence of any inflammation, pathology or developmental anomaly on lips and patients with known hypersensitivity with lipstick.

**STUDY MATERIAL**

Dark colored lipsticks, cellophane tape, bond sheets, magnifying lens, scissors, and tissue papers as shown in figure 1.

**METHODS**

A thin film of lipstick was applied onto cleaned and dried lips and left for 3 min (Figure 2). Then subject was asked to rub both the lips to spread the lipstick uniformly. The impressions of the lips were taken on the self adhesive cellophane tape and then immediately transferred onto the bond sheets (Figures 3, 4 and 5). The analysis of these lip prints patterns was done with the help of magnifying lens used in the study.

Fig. 1: Material used in the study



Fig. 2: Application of lipstick over lips of the study subject

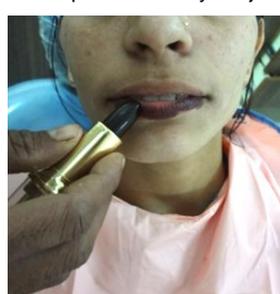


Fig.3: Cellophane tape placed on lips for recording of pattern



Fig. 4: Pattern pasted onto bond paper

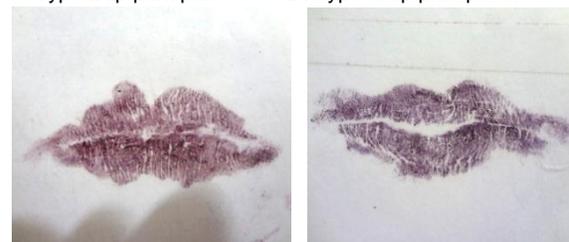


Fig. 5 (A,B,C,D,E,F,G): impressions of types of lip print patterns taken from study subjects

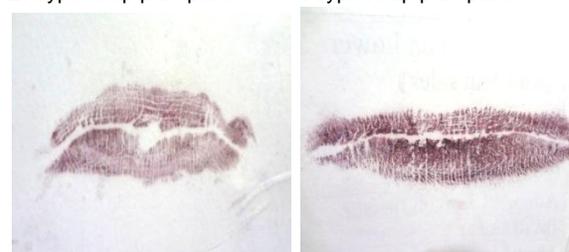
A. Type I lip print pattern      B. Type I' lip print pattern



C. Type II lip print pattern      D. Type III lip print pattern



E. Type IV lip print pattern      F. Type IV lip print pattern



G. Type V lip print pattern



For analysis of lip prints, classification proposed by Tsuchihashi<sup>3</sup>, was used. (figure 6) It was as follows: TYPE I: Clear cut vertical grooves that run across the entire lip.

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

Type II: Branched grooves with Y shaped pattern.

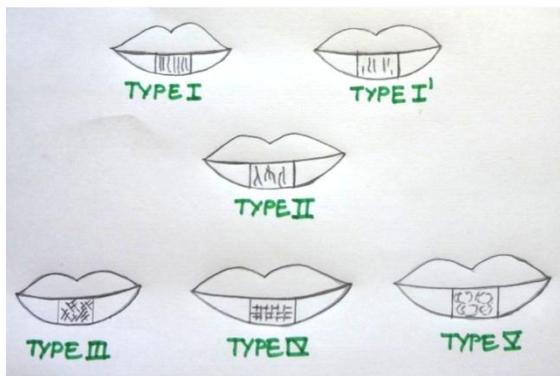
Type III: Intersecting grooves.

Type IV: Crisscross pattern, reticular grooves.

Type V: Undetermined pattern.

Data was then tabulated and analyzed statistically.

Fig. 6: Classification of lip print patterns



**Statistical Analysis**

The data thus obtained was entered in Microsoft office excel sheet (version 2007). Statistical analysis was performed using SPSS (Statistical Package for Social Sciences) software version 17. Chi square test was used for comparison of prevalence of lip print patterns in male and female. Results of this statistical analysis showed no significant differences in this regard ( $p = 0.42$ ). Thus no statistically significant differences were found in the prevalence of lip print patterns in male and female. ( $p > 0.05$ ) The percentage distribution of lip print patterns in male and female is shown in chart 1 and in overall population is shown in chart 2.

Chart 1: Sex-wise distribution of lip print patterns

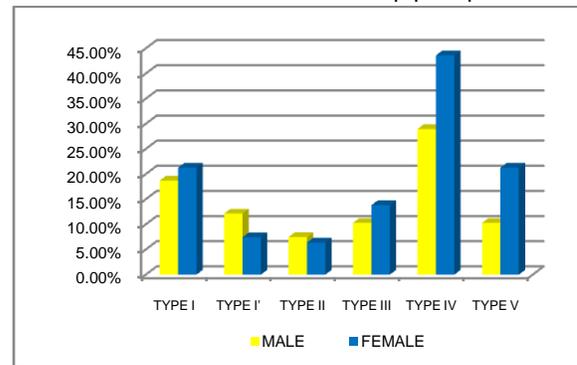
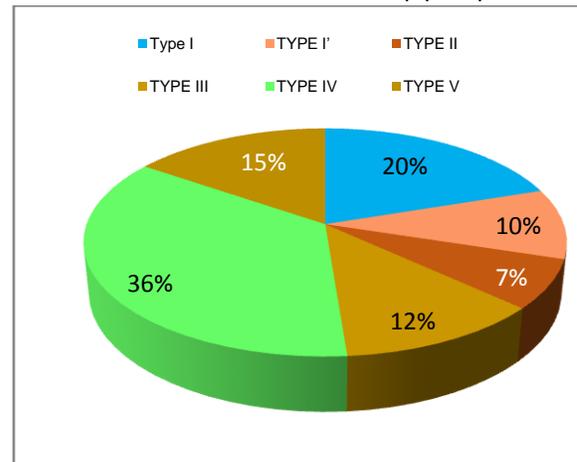


Chart 2: The overall distribution of lip print patterns



**RESULTS**

Result showed that most prevalent pattern in Rajasthani population was found to be Type IV, followed by type I, type V, type III, type I' and type II being the least prevalent. (Chart 1 and 2) The statistical analysis with chi square test revealed no statistically significant differences were found among male and female subjects in their prevalence.

**DISCUSSION**

The data from this study (table 1, chart 1 and 2) shows that most prevalent lip print pattern in Rajasthani population, was found to be type IV for both male and female subjects. No statistically significant differences were found in male and female subjects. This finding is similar to the study done by Verghese et al, although subjects included were from south Indian population (Kerela) [4]. This predominant pattern in Rajasthani population was followed by type I, type V, type III, type I' patterns and the least common lip print pattern was found to be type II. In study done by J. Augustine et al, in rural and urban

localities of Aurangabad, Maharashtra, the most predominant pattern in entire study population, taking both the upper and lower lips together, was type III which constituted 48.2% of all patterns [5]. This was followed in order by type II (18.92%), type IV (17.44%), type I (11.10%), type I' (2.54%) and type V (1.58%). Costa et al evaluated the morphologic patterns of lip prints in Portuguese population and found type II pattern to be most common [6]. Their comparison of lip-print patterns between males and females showed results with a statistically significant difference: type III pattern was most common in males, and a type II pattern in females.

Lip prints show differences according to race and ethnic origins of a person. Their unique characteristics prove themselves as a strong tool for identification. Studies regarding prevalence of lip patterns in different races or ethnic origins, have been reported to show variations of patterns not only in population but also in male and female subjects [7].

No previous studies regarding prevalence of lip print patterns in Rajasthani population have been reported. This study will provide the way forward for further studies with large groups.

In this study, the middle portion of lip was taken for print analysis, as this is the most visible area on entire lip and patterns can easily be identified.

## CONCLUSION

Lip prints are important tools for identification. In an attempt to determine the prevalence of lip print patterns in Rajasthani population, the results of this study show that that most prevalent pattern in Rajasthani population was Type IV, followed by type I, type V, type III, type I' and type II being the least prevalent. No statistically significant gender differences were found in their prevalence. Further studies with large population groups will help in providing the practical applications of this identification method.

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