INTRODUCTION

Forensic odontology is that branch of dentistry which involves the examination, evaluation, presentation, and management of dental evidence in civil or criminal proceedings for the identification of suspected individuals, all in the interest of justice. The forensic odontologist deals with the law and assists legal authorities by providing sufficient dental evidence in different situations. Forensic odontology has evolved to such an extent that dentists are using various scientific methods to identify both the victim and the culprit in many of the crime investigations. According to Dr. Acharya and Taylor, “identification” means those characteristics by which an individual can be recognized. The main principle of identification is that combinations of dental and non-dental characteristics used are never the same. Forensic odontologists most commonly uses dental characteristics for identification because most of them believe that human dentition is unique. Soft tissue characteristics like surface of lips and fingerprints have also been used widely for the human identification and sex determination in the last few years. The outer surface of lips has many linear grooves which may be seen as vertical, horizontal intersecting, and branching. This pattern will be unique to individuals, and the study of these patterns is known as quiloscopy/cheiloscopy. Authors believe that cheiloscopic patterns are individualistic.

OBJECTIVE

The aim of this short study was to study the pattern of lip impression in North Bengaluru population.

MATERIALS AND METHODS

MATERIALS USED FOR THE STUDY INCLUDED

A dark colored lipstick, cellophane tape/scotch tape, A4 sheet paper, and magnifying lens.

METHODS

This study included 100 individuals from North Bengaluru who visited the Department of Oral Medicine of Sri Rajiv Gandhi Dental College. An equal number of male and female patients within the age range of 22-35 years were included. Individuals
with wounds, lesion and scars on lips were excluded from the study. Individuals who were hypersensitive to lipsticks were excluded from the study. The lipstick was applied evenly over the surface of lips with a single uniform stroke. The individuals were asked to spread the lipstick uniformly by rubbing both the lips together. Using a cellophane tape impression of lips was taken. This was done by placing the sticky portion of scotch tape over the lips and then slowly pressing in the center, and then repeating the same toward both the corners of lips. The cellophane tape along with the lip impression was then stuck on the A4 sheet [Figure 1]. The impression was then studied with the help of a magnifying glass. According to Dr. Shivapathasundaram, properties of the lines in the center of the lower lip was very clear in the impressions compared to those near the corners. Hence, in this study, this portion of the lip was selected as the study area. Lip pattern classification given by Tsuchihashi was used to study the elevations and depressions in the impression obtained. The name of the patient, age, sex and the type of lip pattern obtained were recorded.

Results

In the present research after studying the patterns, we found that the lip prints were individualistic, i.e. no two lip impressions were identical. Type IV (reticular/crisscross lines) was the most common pattern in the group of males (24%). This was followed by intersected type (13%) and branched type (8%). The vertical groove type was the least common type (1%) [Table 1 and Graph 1]. Type II/branched pattern (20%) was the predominant pattern in female group. This was followed by reticular type (13%), vertical groove type (6%), and intersected type (4%). The least common pattern was Type I/incomplete vertical groove pattern (3%) [Table 1 and Graph 1]. The most common patterns in males were reticular and intersected and in females were branched and reticular type [Graph 2]. Hence, when the lip patterns in North Bengaluru people were assessed the most common type was reticular type/Type IV (37%) followed by Type II/branched type (28%).

Discussion

Lip prints are lines/grooves (vertical, horizontal and crisscross) visible on the lips. The study of patterns of lip impression is called cheiloscopy. These grooves are heritable and individualistic. Lip prints are, therefore, considered as a strong evidence left at the area of crime like fingerprints.

History

- 1902: Fischer (anthropologist) first described the grooves and fissures on lips.
- 1932: Edmond Locard (criminal investigator) suggested the use of lip prints in criminalization and personal identification.
- 1950: Synder first pointed out that the lines and fissures on the lips have individual variation like fingerprints. In the same year, he published his reports in the book

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Table 1: Distribution of type of lip prints among patients

<table>
<thead>
<tr>
<th>Lip print pattern</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Type I'</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Type II</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Type III</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Type IV</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Type V</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Graph 1: Distribution of lip patterns in the study subjects

Graph 2: Distribution of types of lip pattern in genders
Lip prints in North Bengaluru population

Nagaraj, et al.

“Homicide Investigation” and concluded that lip patterns are individualistic.¹

- 1967: Suzuki conducted detailed study on the patterns and measurement of the lips to obtain useful data for applications in forensic investigation.
- 1970: Suzuki and Tsuchiashi conducted study on 107 families in Japan and named the lines on lips as sulci laborum. The lip impression with these grooves was named as figura linearum laborum ruborum.²
- 1973: Uniqueness of patterns of lip impression was proved by Tsuchiashi, who studied more than 1300 lip prints.
- 1975: Tsuchiashi first did quadrant wise study of patterns on lip impression. Suzuki and Tsuchiashi applied their classification in two criminal cases.³
- 1982: The uses of cheiloscopy were reported by Cottone in his book on Forensic Dentistry.⁴
- 1990: To highlight the practical use of cheiloscopy, Kasprzak conducted a study on 1500 people for a period of 6 years.⁵
- 2000: Vahanwala conducted many researches on lip patterns to highlight the role of cheiloscopy in forensic identification.⁶
- 2006: Lysochrome dyes were used for colorless lip prints.⁷

Many researches are done to detect the relationship of lip print patterns to patterns of palatal rugae, thumbprint, blood groups, genders, and also association of patterns among twins. Studies on various aspects of the lip impression like morphological patterns and stability are still going on.⁸⁻¹⁰

**Lip print pattern classification**

The first classification was given by Santos in the year 1967 as:

1. Type I (vertical lines that are running along the full length of the lips)
2. Type I’ (vertical lines ending half way)
3. Type II (lines/grooves forking at the end)
4. Type III (/mesh pattern/intersecting lines)
5. Type IV (reticular/crisscross lines) and
6. Type V (lines which cannot be categorized into other types).

Most of the time, all these patterns will be seen in the same individual. Hence, to reduce confusion and to simplify the process of recording the patterns, lips are divided into sections/quadrants. Then, the types of grooves in each section can be recorded.⁵

According to Ehara and Marumo, lip prints are commonly left at the area of crime and provide a direct link to identify the suspect and are an important form of evidence from a crime scene. Usually, lip-prints are left on cigarettes, glasses, cups which are on the crime scenes.¹¹ Recently, new lipsticks have been introduced into the market that do not leave any identifiable marks/traces. Such lip prints can also be visualized using reagents like metallic powder and lysochromes.¹² Some authors have also advocated the use of a fluorescent reagent such as Nile red for similar cases. The dyes are applied to the area of interest and then visualized under ultraviolet or blue light.¹³⁻¹⁵

In the present research, most commonly identified pattern of lip impression in North Bengaluru people was reticular type. This was followed by branched pattern and other patterns. In a study conducted by Sneha et al. (2014) in 85 individuals, branched pattern and intersected pattern was found to be the most common pattern in the people of Karnataka.¹⁶ In the study by Patil et al., reticular pattern/Type IV was the common pattern of lip impression in both the sexes in the people of North Karnataka and the present study was found to be in accordance with this study.¹⁷

**Limitations of the quiloscopic study**

The common limitation of study of patterns of lip impression was the difficulty to identify the patterns. These unidentifiable patterns occur due to smudging while making the impression. According to Tsuchiashi, this is because the grooves are on the transition zone of the lips and are being extremely mobile. Hence, there is a possibility that lip prints of one person may be mistaken for others. Another major limitation of lip print investigation is that the lip patterns of an individual may change following any major trauma to the lips which can result in scarring.¹⁸

**Conclusion**

Many researches done in the field of cheiloscopy highlights the fact that the external surface/outer surface of lips is used to identify a suspect. In this study, we found that the predominant pattern of lip impression in North Bengaluru population was reticular and intersected in males and branched and reticular type in females. Further studies have to be conducted with a
larger sample size to confirm the predominance of a specific pattern in a geographic location so that this will be a great help for any criminal investigations.

References
