Original Research Paper

A Study of Efficacy of Lip Prints as an Identification Tool among the People of Karnataka in India

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Abstract

This is a study of cheiloscopy done on the subjects from south Karnataka districts in India. Lip prints from 100 male and 100 female subjects were studied to determine the predominant lip print type and to look for any correlation between lip print types and blood groups. Tsuchihashi’s classification of type I (complete vertical grooves), type I’ (incomplete vertical grooves), type II (forking grooves), type III (intersecting grooves), type IV (reticular grooves) and type V (indeterminate grooves) was used. Only the middle 10 mm of the lower lip was studied as this is the area most often found at a crime scene. The prints were obtained using lipstick and cellophane tape. It was observed that type IV (reticular) was predominant in the subjects chosen for the study and that there was no correlation between blood groups and lip print types.

Key words: Cheiloscopy, Blood groups, India, Lip prints, South Karnataka

Introduction:

Identification of a person is of paramount importance in a medico-legal investigation. A wide range of methods is available for this purpose out of which one of the best and most often used is fingerprints. Perhaps for this very reason, the awareness of fingerprints is very high in the general public and a significant proportion of offences are committed with deliberate attempts not to leave behind fingerprints at a crime scene.

An alternative mode of identification is cheiloscopy, which is the study of the grooves and furrows present on the red part of the human lips. 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. One of the earliest workers was Dr. Martinez Santos from Brazil who classified the furrows on the lips and showed that they can be used for identification.

Specialists in anthropology, stomatology and forensic medicine from different parts of the globe such as France, Italy, West Germany, Great Britain, Iran and Czechoslovakia have also carried out cheiloscopic research. [1]

In 1976 in Milanowek in Poland during a burglary investigation, a technician looking for fingerprints found a trace of the lips. It turned out to belong to the daughter of the owners. In this case, the cheiloscopic evidence had an eliminatory character. [1] In the following years more instances of cheiloscopic identification took place. One of these concerned a burglary where a piece of cake was found with a trace of teeth. On examination it revealed a lip print as well and a categorical result as to the burglar could be obtained. It brought to attention that lip prints are often found along with teeth marks. Another notable point is that the lip print remained on the cake for three months. [1]

The following years showed a rise in the acceptance of cheiloscopy in the legal community. Cheiloscopy workshops are conducted by the Federal Bureau of Investigation in the United States of America and in 1999, a U.S. court accepted the testimony of two state police experts that lip print identification is generally accepted within the forensic science community as a method of positive identification. [2] The use of lip prints is not limited to visible traces left at a scene of crime. Latent or invisible prints can be developed or made visible in a manner similar to that used for fingerprints. In 1982 the Forensic Institute of Warsaw University studied the latent lip prints of 1500 persons. The prints were visualized with ferromagnetic powder and then fixed on transparent foil. It resulted in a catalogue of 23 types of individual features. [3]

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FAV studied latent lip prints left behind by permanent or ‘persistent’ type of lipsticks. Contrary to conventional lipsticks, these do not leave visible prints when they come in contact with a surface. They used three developers – aluminum powder, cobalt oxide powder and magnetic powder. They found that aluminum and magnetic powders gave better results than the cobalt oxide powder. [4] Apart from its use in the positive identification of the individual, cheiloscopy may also be able to provide additional information about the person. Studies have been carried out in an attempt to determine the sex from the lip print. [5]

Other workers have attempted to discover possible ethnic variations in the lip print. Yasuo Tsuchihashi studied the lip prints of 757 males and 607 females of Japanese origin. He classified the lip prints into six types according to the shape and course of the grooves. These were:

- **Type I:** clear-cut grooves running vertically across the lip.
- **Type II:** the grooves are straight but disappear halfway.
- **Type III:** the grooves fork in their course.
- **Type IV:** the grooves intersect.
- **Type V:** the grooves do not fall into any of the types I to IV.

Tsuchihashi found that Type III was predominant among the Japanese subjects. [6] In India, Vahanwalla and Parekh studied lip prints from 50 male and 50 female subjects from Mumbai. They found that type I was predominant in the lower lip among the females and that the male subjects tended to have different types in all quadrants of the lips. [5]

Sivapathasundharam, Prakash and Sivakumar studied the lip prints of 200 Indo-Dravidian persons and they followed Tsuchihashi’s classification of types I to V. They also found that type III was predominant. [7]

Manipady did a study on lip prints in which he compared Indian and Chinese subjects. His findings were different from the previous two studies for he discovered that type II was predominant among both the Indian and Chinese persons. In our study we have searched for the predominant lip print type among the persons from south Karnataka districts in India and we have also looked into a possible correlation between lip print types and blood groups. We have used the lipstick-cellophane method to record the prints. A variety of methods are available in literature, such as photographing the lips, taking the prints directly on to paper (without using cellophane tape) and obtaining three-dimensional casts of the lips. The last method utilizes dental impression materials and gives good quality casts in which the grooves on the lips can be seen clearly. The time consumption, high level of technical skill required and cost considerations were however prohibitive for our study. From among the other methods, considering the time factor, ease of taking the prints and the clarity of the grooves; we preferred the lipstick-cellophane method.

**Materials and Methods:**

1. Lipstick of a bright red color and non-glossy, commercially available.
2. Cellophane tape that was transparent and glued on one side. The width was 0.9 cm.
3. White bond paper, unglazed
4. Magnifying lens
5. Tissue paper

Subjects were 100 males and 100 females of south Karnataka origin between the ages of 18 and 25 years. All were 1st and 2nd year students of the J.S.S. Medical, Dental and Ayurveda Colleges in Mysore, Karnataka and the subjects were aware of their blood groups. The cases with any evidence of disease or injury of the lips were not included. Subjects were informed about the study and written consent was obtained prior to recording the prints.

**Procedure:**

The upper surface of the lipstick was wiped clean on tissue paper prior to each use for hygienic purposes. The subject was asked to open the mouth and lipstick was applied in a single motion evenly on the upper lip, then on the lower lip. The subject was asked to rub the upper and lower lips together in a horizontal direction, to spread the lipstick evenly on all parts of the lips. A strip of cellophane tape about 10 cm long was cut. The subject was asked to open the mouth slightly and to keep the mouth stationary during the procedure. The glued portion of the tape was applied on the lower lip. It was held in place, applying gentle and even pressure for a few seconds to allow the print to form on the tape.

The tape was then lifted carefully from the lip from one end to the other, avoiding any smudging of the print. The strip of cellophane tape was then stuck on to a piece of white bond paper. The above steps were repeated for the upper lip. The excess tape was folded on to the reverse side of the paper and the subject’s serial number was written on the paper to serve as a record. The subject was provided with tissue paper to clean the lips. A vertical line was drawn with a pencil at the centre of the print. At a
distance of 5 mm on either side of this line, parallel lines were drawn to the first line. These lines demarcated the middle 10 mm of the lower lip, which was the area to be studied. This was chosen because the centre portion of the lower lip is the area that is most frequently found at a crime scene.

Quadrants were drawn on paper, which were similar to the Zsigmondy-Palmer system of dental charting. The lip print was studied under a magnifying lens. The grooves were classified according to Tsuchihashi’s classification of types I to V. These types were written on the chart as grooves present on the lower left or the lower right quadrants. The predominant type in each quadrant was noted.

**Statistical Methodology:**

This study was done using Software Package for Social Service (SPSS). The frequency of each lip print type was tabulated and the percentage of each type was calculated. The chi square ($\chi^2$) test was applied to see whether there was any association between the lip print types and blood groups. It is calculated as:

$$\chi^2 = \Sigma \frac{(\text{Observed frequencies } - \text{ Expected frequencies})^2}{\text{Expected frequencies}}$$

Expected frequencies
Where, $\Sigma$ denotes summation
“$p$” value is probability role at 0.05 level of significance for corresponding degree of freedom. $p<0.05$ is significant, $p>0.05$ is not significant

**Results:**

The most frequent is type IV, which is the reticular type of lip print. (Table 1) The contingency coefficient was 0.251. The $p$ value was more than 0.05 showing that there was no correlation between the lip print type and the blood group of the subject. (Table 2)

**Discussion:**

Our study on persons from the state of Karnataka, in India found that type IV (reticular grooves) was the predominant type. This is in contrast to the study done by Vahanwalla and Parekh in Mumbai, (which is in the state of Maharashtra), in which they found that type I was predominant in the lower lip among the female subjects. This variance can be explained by the ethnic difference in the subjects studied. The study done by Sivapathasundharam et al was on Indo-Dravidian subjects, who are not quite the same as subjects from the state of Karnataka. They found that the predominant lip print type was type III (intersecting grooves). Manipady’s subjects were not from any one particular part of India, and he found type II to be predominant among them as well among his subjects of Chinese origin. These studies suggest that there is ethnic and racial variation in the lip print.

This particular aspect of cheiloscopy is currently in its nascent stage of investigation; therefore with the information available at present, it may not be possible to categorically state the ethnic origins of a person by studying the lip print. However further work on the subject may elucidate this data from the lip print. As far as the relationship goes between lip print types and blood groups, our study showed that no correlation exists. Lip prints can be a useful adjunct to fingerprinting in the identification process. In most of the countries across the globe, efficient machinery is already in place for the detection, recording and matching of fingerprints of a suspect. Similar equipment can be employed for lip prints and fingerprint experts can be trained to perform cheiloscopic identification exercises. This can greatly enhance the apprehension of suspects and their conviction in the courts of law.

**Table 1: Frequency & %age of lip print types**

<table>
<thead>
<tr>
<th>Lip print type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Type I'</td>
<td>28</td>
<td>48</td>
</tr>
<tr>
<td>Type II</td>
<td>49</td>
<td>96</td>
</tr>
<tr>
<td>Type III</td>
<td>47</td>
<td>100</td>
</tr>
<tr>
<td>Type IV</td>
<td>63</td>
<td>132</td>
</tr>
<tr>
<td>Type V</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

**Table 2: Correlation of lipprint type & Bld Gp**

<table>
<thead>
<tr>
<th>Lip print type</th>
<th>Blood groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>A+ A- B+ O+ O- AB+</td>
</tr>
<tr>
<td>Type I'</td>
<td>2 0 2 2 4 0 0 0</td>
</tr>
<tr>
<td>Type II</td>
<td>11 0 18 18 2 1 1 1</td>
</tr>
<tr>
<td>Type III</td>
<td>23 2 26 39 2 2 4 4</td>
</tr>
<tr>
<td>Type IV</td>
<td>20 1 36 36 1 1 5 5</td>
</tr>
<tr>
<td>Type V</td>
<td>37 0 31 53 1 1 1 10</td>
</tr>
</tbody>
</table>

Note: there were no subjects with the blood groups B- and AB-

**References:**