# A Correlation Study between Fingerprints and Lip Prints among Twins

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## Abstract

**Introduction:** Fingerprints and Lip prints has its reliability for its uniqueness and can be used solely as an aid in identification for civil and criminal cases. Hence a correlation between the fingerprints and lip prints can bring up a new approach or idea in the field of Forensic Medicine for solving medicolegal cases. The present study was conducted on 25 pairs of twins with the main objective to find any existing correlation between fingerprints and lip prints and to determine the most predominant finger print and lip print pattern among Twin A and Twin B individually.

**Materials and Methods:** The study was done is subjects age ranging from 6-18 years. A proforma with subject particulars and consent form was prepared. Lip prints were obtained in a drawing chart, the middle part of the lower lip was analysed based on Suzuki and Tsuchihashi classification. Fingerprint of left thumb finger was obtained in a white paper and analysed based on Henry's system of classification.

**Results:** The present study showed that there was no significant correlation between the Lip prints and Fingerprints in Twins with p value >0.001. Among twin A and twin B the most predominant Lip print pattern was Type I' and the Fingerprint pattern was Loop pattern respectively.

**Conclusion:** Lip prints and Fingerprints are two important parameters for an individual in identification. There are various studies till now in individuals but very few in twins. So, in this study we made an attempt to find the correlation between the parameters, whether they were existing or not and found that there was no significant correlation yet can be used as a separate tool. Hence it is essential to perform further studies on a larger group and create a database for getting accurate results.

***Keywords:*** *Lip prints. Fingerprints, Twins, Correlation, identification.*

## Introduction

Identification of a person be it living or dead is based on the fact that each one are unique in their own way. Generally, based on the physical characteristics the identity of an individual can be established, but when it comes to legal issues which requires additional information, various parameters are required to give a confirmatory result. There are many successful and experimental methods which are used to identify the person based on the unique characteristic they possess. It includes anthropometry,

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odontology, dermatoglyphics, fingerprints, age and sex determination, estimation of stature, handwriting, bite marks and DNA analysis[1] . These evidences are crucial in both civil and criminal cases to aid the forensic expert to give a conclusion and at times help the police personnel in investigation. The most common physical evidence that stands as a gold standard for identification is Fingerprints. Though, it is an age old method, it has been useful in identification in the illiterates also. Based on its apparent permanence and uniqueness of the epidermal ridges, in every medicolegal work involved and the courtroom acceptance it claims to be a valuable one.

The study of fingerprints is known as Dermatoglyphics or Dactylography or Galton-Henry system[3] . Since the ridge patterns formed are unchanged, after death even in highly decomposed bodies, with the help of migration of chloride ions, the age of the fingerprint can be assessed whereas in the living the fingerprints can be traced by examining the crime scene, the objects handled. But in the present scenario, criminals are more aware and knowledgeable about the evidences they leave behind especially the fingerprints and try to conceal them. So, an alternative and useful technique which is not much in vogue are Lip prints, left on the materials used, the surfaces touched, the places in contact with and also over the skin of the victim in sexual offence cases.

Cheiloscopy is the study of grooves and furrows present on the zone of human lip[3]. This method of analysis is similar to the concept of fingerprints hence it serves as an ancillary method. To establish the identity, it is not mandatory to collect direct lip prints, the prints which are produced by the secretions of sebaceous and sweat glands on the edges of the lips, produces latent prints which can be developed later by various techniques using magnetic powder, aluminium powder, Sudan III stain etc. There are many successful studies and detailed research done on fingerprints and lip prints individually, whereas a combined studies with the two parameters are very few. Moreover, the target study involving the tools of identification among twins, is relatively very less and has left a void in the research field. So, this study focuses on the twin population using fingerprints and lip prints as the source of identification. Since both Cheiloscopy and Dermatoglyphics play a vital role in identification, a correlation study between both, may help in investigations when either of the evidence or both were found, as studies with their association is very scanty, especially in twins is rare in literature. Reference data including various parameters are of paramount importance in solving forensic cases [2]. The main objective of the study is to find the correlation between the fingerprint and lip print pattern among Twin A and Twin B, also to determine the commonest fingerprint and lip print pattern among them and to know the most frequent the rarest combination.

## Materials and Methods

The present study was conducted on 25 pairs of twins with age ranging from 6-18 years. The elder one was considered as Twin A and the younger one was taken as Twin B. A proforma was made with particulars like Name, Age, Sex, Date of birth, address, phone number along with a consent form, a white paper and a drawing chart attached. Before heading with the procedure informed consent was taken form the parents in case of minors. Then the procedure was explained verbally in detail, regarding imprinting the fingerprint and lip prints. For obtaining the fingerprint the subject was asked to wash hands thoroughly with soap and water, dry them using the towel. Then they were asked to press the left thumb on to the stamp pad and then keep it over the white paper to imprint the fingerprint. Necessary precautions were taken from sliding of fingers to avoid smudging of the prints. The subjects were asked to relax the arm and not to try to help in rolling the fingers as it may cause smearing.

The fingerprints were obtained and were studied with the magnifying lens. The findings were based on the Henry's system of classification.

1. Loop
2. Whorl
3. Arch
4. Composite


In composite variety, there is a combination of more than one pattern either a loop or whorl pattern or two different loop patterns. To avoid confusion, the subjects with composite pattern of fingerprints were excluded from the study.

For taking the lip prints the subject was made to sit on a stool in front of a table and was advised not to move so that recording of lip prints will be accurate. The subject was asked to keep the mouth closed, lip muscles relaxed and record the lip print. A dark colour lip stick was applied all over the lips up to the lip line and the individual was made to bend forwards and imprint the lip on the drawing chart, press it firmly forwards and roll it sidewards to right and left side respectively. The drawing chart was air dried for few minutes and then visualised using the magnifying lens for the grooves and wrinkles on lip prints. The findings were based on KazuoSuzuki and Tsuchihashi Classification [5]. The middle part of the lower lip (LM) (10mm wide ) was considered as the study area as this was suggested by *Sivapathasundaram et al*[4] .Since this part of lip is mostly the visible area in any trace, based on the numerical superiority of properties of lines the observations are made to determine the pattern.

| | |
|---|---|
| Type I | A clear-cut line or groove running vertically across the lip |
| Type I' | Straight grooves that disappear half way into the lip instead of covering the entire breadth of the lip or partial-length groove of Type I |
| Type II | Grooves that fork in their course or a branched groove |
| Type III | An intersected groove |
| Type IV | A reticular groove |
| Type V | Grooves that do not fall into any of the above categories and cannot be differentiated morphologically |

After recording the fingerprint and lip print patterns from the subjects, the data was entered in MS Excel 2010 and then analysed using statistical package SPSS version 22 for windows and considering p value <0.001 statistically significant.

## Results

**TABLE 1: DISTRIBUTION OF LIP PRINTS IN TWIN A AND TWIN B**

| LIP PRINT PATTERN | TWIN A | TWIN B |
|---|---|---|
| I | 4(16%) | 6(24%) |
| I' | 10(40%) | 7(28%) |
| II | 5(20%) | 6(24%) |
| III | 4(16%) | 5(20%) |
| IV | 2(08%) | 1(4%) |
| V | 0 | 0 |

Table 1 shows the overall distribution of lip prints observed in the study subjects on the middle art of lower lip.

**TABLE 2: DISTIRBUTION OF FINGERPRINTS**

| PATTERNS OF FINGERPRINT | TWIN A | TWIN B |
|---|---|---|
| Loop | 11(44%) | 13(52%) |
| Whorl | 08(32%) | 10(40%) |
| Arch | 06(24%) | 02(08%) |

Table 2 shows the overall distribution of fingerprints in the study subjects of the left thumb finger.

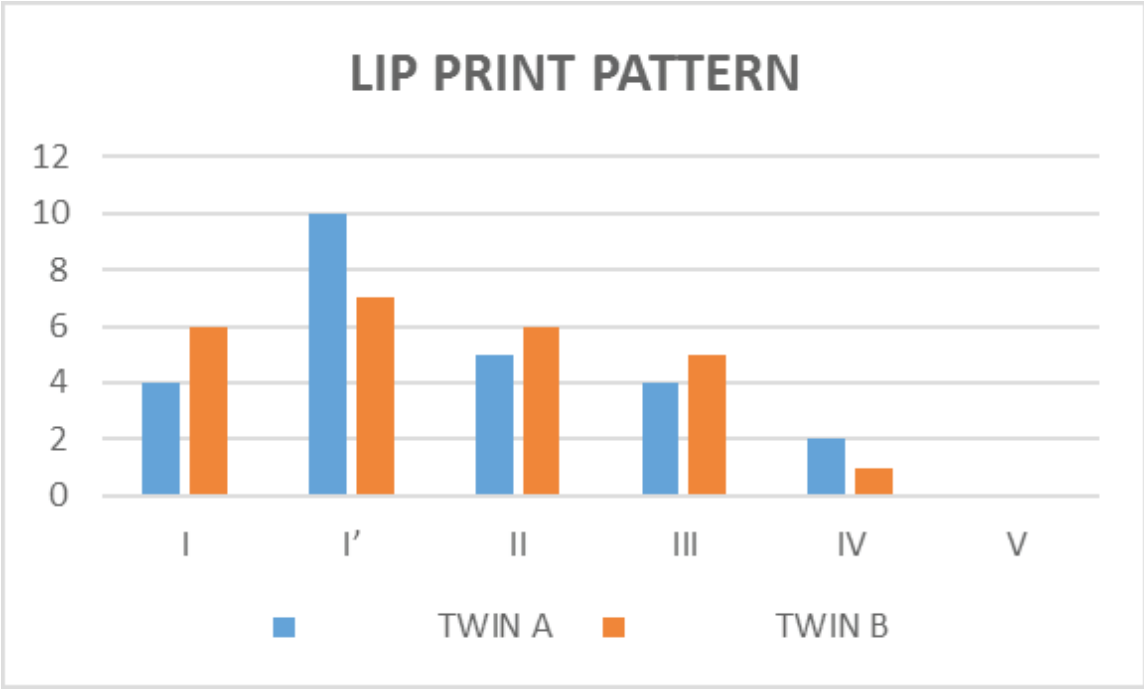


**FIGURE 1: COMMON LIP PRINT PATTERN IN TWIN A AND TWIN B**

Figure 1 shows the predominant lip pattern among both Twin A and Twin B is Type I' while the less common being the Type IV patten and the rarest in Type V pattern.

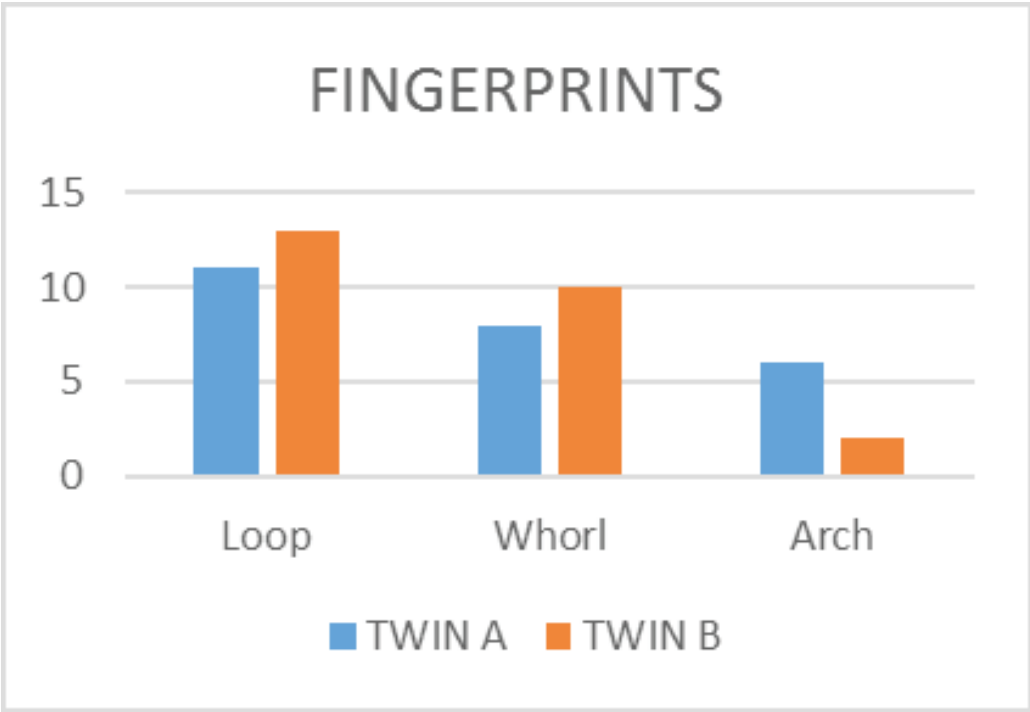


**FIGURE 2: COMMON FINGER PRINT PATTERN IN TWIN A AND TWIN B**

Figure 2 shows the predominant fingerprint pattern observed in Twin A and Twin B is Loop pattern and the less common is the Arch pattern.

**TABLE 3: CROSS TABULATION OF LIP PRINT PATTERN - FINGER PRINT PATTERN IN TWIN A**

| LIP PRINT PATTERN | | FINGERPRINTPATTERN | | | Total |
|---|---|---|---|---|---|
| | | LOOP | WHORL | ARCH | |
| | I | 2 | 2 | 0 | 4 |
| | I’ | 6 | 0 | 4 | 10 |
| | II | 1 | 4 | 0 | 5 |
| | III | 2 | 1 | 1 | 4 |
| | IV | 0 | 1 | 1 | 2 |
| Total | | 11 | 8 | 6 | 25 |

**TABLE 4: CORRELATION OF LIP PRINTS WITH FINGERPRINTS IN TWIN A**

| | Value | df | p value |
|---|---|---|---|
| Pearson Chi-Square | 13.442[a] | 8 | 0.098 |
| | | | (>0.001) |
| | | | |
| | | | |

**TABLE 5: CROSS TABULATION OF LIP PRINT – FINGERPRINT IN TWIN B**

| LIP PRINT PATTERN | | FINGERPRINTPATTERN | | | Total |
|---|---|---|---|---|---|
| | | LOOP | WHORL | ARCH | |
| | I | 5 | 0 | 1 | 6 |
| | I’ | 4 | 2 | 0 | 6 |
| | II | 2 | 3 | 1 | 6 |
| | III | 2 | 4 | 0 | 6 |
| | IV | 0 | 1 | 0 | 1 |
| Total | | 13 | 10 | 2 | 25 |

**TABLE 6: CORRELATION OF LIP PRINTS WITH FINGERPRINTS IN TWIN B**

| | Value | df | p value |
|---|---|---|---|
| Pearson Chi-Square | 9.455a | 8 | 0.305 |
| | | | (>0.001) |
| | | | |

## Discussion

In the present study, the overall distribution of lip print pattern was observed to be in the order of the sequence showing Type I' being the most common pattern followed by Type II , the least common was Type IV and Type V was not present in any of the subjects. In Twin A, the predominant lip print pattern was found to be Type I' with 40% followed by Type II with 20% , Type I and Type III with 16 % distributed equally , and the least common was Type IV pattern respectively. Among Twin B Type I' pattern was the most predominant pattern with 28% followed by Type I and Type II with 20% equally distributed, the least commonly seen pattern was Type IV with 4%. However, the study conducted by Suzuki and Tsuchihashi on 18 pairs of twins showed Type III was the most common pattern[5]. Another study done by Bhavna Thakur et al on 40 pairs of twins showed Type III was the predominant pattern[6.] The study done by Fakir Mohan Debta et al on 30 pairs of twins resulted with Type II being the predominant pattern followed by Type IV patten[8]. But our observations were based on analysis of only the middle part of lower lip whereas, the above mentioned studies followed the four quadrant method to analyse all the quadrants of the lips. Hence our results are not concordant with the previous studies.

On observation of the fingerprints of the left thumb, the present study showed the most common finger print pattern is Loop, followed by Whorl pattern and the least being arch pattern. Among Twin A the predominant fingerprint pattern was loop with 44% followed by whorl with 32 % and arch pattern with 24%. In Twin B the most common pattern is Loop with 52% followed by whorl with 40% and the least pattern observed is arch with 8%. These observations were similar to the study conducted by Murad Ali et al on 30 pairs of twins, in which they found the loop pattern was common with 62.3% followed by whorl with 29.93% and the least being the arch pattern with 7.6%[7]. On reviewing the literature it showed that the frequency of distribution of fingerprint pattern seemed to follow the same order of predominance irrespective of age and sex.

On assessing the relationship between the Lip print and Fingerprint patterns in twins by using chi square test it is found that there is no significant correlation with the two parameters since p value > 0.001. However there are few studies which have been done in twin population to assess the inheritance from the parents to the twins by correlation using multiple parameters and have found out mixed results with both positive correlation and negative correlation for few. There are many studies which are based on correlation between fingerprints, lip prints, palm

prints, blood groups done on males and females. But to our best knowledge and on reviewing the literature this is the first study of its kind to study the correlation of fingerprints and lip prints in twins.

## Conclusion

The results revealed that fingerprints and lip prints are unique structures so they are considered a never failing tool for identification individually. Though the present study resulted in an insignificant correlation between lip prints and fingerprints in twins, it is still suggestive that they can be used as individual parameters or a aid in identification. In case of very few evidences left behind it can definitely be used to support certainity in crimes though the correlating factor may not be precise. It is a simple attempt to establish correlation between fingerprints and lip prints in twins which is uncommon, yet can also be done in other subjects as well for further clarity and better understanding. Nevertheless, further studies in twins with a larger sample size, using a basic database for the tool of identification, will be essential in interpreting the results accurately.

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**Ethical Clearence:** Not Required.

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