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SECTION IDENTIFICATION

CORRELATION BETWEEN LIP PRINTS AND FINGER PRINTS IN SEX DETERMINATION AND PATTERN PREDOMINANCE IN 5000 SUBJECTS

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ABSTRACT

Fingerprints are considered to be the most reliable criteria for personal identification. In the past decades, lip-print studies (Cheiloscopy) attracted the attention of many scientists as a new tool for human identification in both civil and criminal issues.

The present study was undertaken to observe the correlation between lip prints and finger print pattern in sex determination and to determine the pattern predominance in a sample of 5000 individuals. The study was carried out in 5000 individuals in Department of Oral Medicine and Radiology of Maharishi Markandeshwar College of Dental Sciences and Research, M.M. University, Mullana. Of the participants, 2500 were males and 2500 females. Lip prints and finger prints of the right hand were collected then studied and analyzed statistically. For lip prints TSUCHIHASHI'S Y. classification (1970) was followed; HENRYS classification (1897) was followed for finger prints. Whorls were of a high frequency in males, but females presented with a high frequency of loops. Type I, P, II lip print pattern was most predominant in females while Type III and Type IV was most predominant in males. The present study described in detail that for both males and females, the most predominant lip-print patterns showed an association with the respective predominant finger print patterns. The establishment of a database of Cheiloscopy and Dactyloscopy is recommended for all individuals in a certain locality, which could be used as a reference in civil litigations and criminal cases.

Such studies may be useful particularly in Forensic science and in justice.

KEYWORDS: Human identification, Civil and criminal, Cheiloscopy, Dactyloscopy

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INTRODUCTION

Forensic science is considered a modern development. Human identification is one of the most challenging subjects that man has confronted¹. The professional obligation of the dental surgeon to mankind is not only to serve in examination, investigation, diagnosis and treatment of oral and orofacial diseases of local and systemic origin but also to serve in other community functions

With the ever-increasing demands placed upon law enforcement to provide sufficient physical evidence linking a person to a crime, it makes sense to utilize any type of physical characteristic to identify suspects guilty of a particular offense. Finger prints also play a primary role in identifying the sex of an individual, thus serving as an important tool for identification purposes. The study of fingerprints is used in identification. Fingerprint recognition is among the most widely used of biometric systems. The use of fingerprint recognition has expanded to personal authentication and government-to-citizen applications as well.²

Another emerging method of human identification and sex determination is human lips recognition, known as Cheiloscopy. Fischer was the first anthropologist to describe the furrows on the red part of the human lips in 1902. The use of lip prints for personal identification was first recommended by French criminologist Edmond Locard in 1932.

According to FBI and the Illinois state police lip print identification methodology is very similar to finger print comparison and is a known and accepted form of scientific comparison.³ Lip prints have the same value as finger print traces. There are normal lines and fissures in the form of wrinkles and grooves present in the zone of transition of human lips between the inner labial mucosa and the outer skin.

Lip prints are unique and do not change during the life of a person. It is safe to assume that cheiloscopy in its present stage

of development has surpassed the limits of its methodology and has become a means of criminalistic identification.⁴

A possible correlation between lip print pattern and fingerprint pattern of an individual may help in sex determination of an individual and may be very advantageous in criminal and forensic practice.

The aim of this study was to find a possible correlation between lip print- and finger print pattern in a group of males and females and the role of lip prints in sex determination. The objectives of the present study were: to determine the predominant lip print pattern in males and females, to determine the predominant finger print pattern in males and females, to establish whether there is a correlation between lip print pattern and finger print pattern and to establish whether lip print pattern and finger print patterns can be of use in sex determination.

MATERIAL AND METHODS

This study was undertaken in a group of 5000 subjects between 20 to 50 years of age, comprising of 2500 males and 2500 females. The present study was carried out in the Department of Oral Medicine and Radiology of Maharishi Markandeshwar College of Dental Sciences and Research, M.M. University, Mullana. Ethical clearance from the institution was obtained to carry out the study.

Collection of prints: The subject was asked to open the mouth and a dark coloured lipstick was applied on the vermilion border with the help of brush with a single stroke. The subject was asked to rub both the lips to spread the applied lipstick. The subject was asked to keep the mouth stationary during the procedure. The glued portion the cellophane tape was applied to the lip. It was held in place by applying gentle and even pressure for a few seconds. Then the tape was carefully lifted from the lip, from one end to the other, avoiding any smudging of the print.

The strip of cellophane was stuck on to a white A4 sheet. This served as a permanent record of the lip print.

Next, the finger prints of the right hand of the subject were taken with the help of an ink stamp pad. Right hand impressions were taken as approximately 85 percent of people are right-handed and this is the side that most Government Agencies collect. The impressions of all the five fingers were taken on the same A4 size sheet as the lip prints. Each A4 size sheet was individually numbered.

Examination of prints: Both registrations were then visualized with the help of magnifying lens so as to check the respective pattern. The prints were examined with the help of a magnifying lens.

The lip pattern grooves in middle 1 cm of lower lip were noted and the grooves were classified according to Tsuchihashis Y. Classification from types I to type IV and the classification recorded on the A4 sheet.



Fig.1: Tsuchihashis Y classification (1970).

Type I: Vertical, comprising of complete [end to end] longitudinal fissures/patterns.

Type I': Incomplete longitudinal fissures. Type II: Branching Y shaped pattern.

Type III: Criss-cross pattern. Type IV: Reticular, typical chequered pattern, fence like.

The finger print patterns were noted according to Henrys' classification and were recorded on the same A4 sheet.

The lip print pattern and the finger print pattern obtained in males and females were recorded. The obtained data was subjected to statistical analysis using Pearson Chi-Square Test. The results were statistically significant. Chi-square test is the most used method for data comparison in a

categorical nominal scale (Arango 2009). Through this method the analysis is made based on the existence of dependency between the variables under observation.

RESULTS

The mean age of the females was 29.78 years with a standard deviation of 8.127 whereas the mean age of the males was 29.89 years with a standard deviation of 8.196

The results showed that Type I lip print pattern was present in 800 females or 32% and 253 males or 10.1%. Type I' lip print pattern was present in 635 females or 25.4% and 343 males or 13.7%. Type II lip print pattern was present in 673 females or

26.9% and 440 males or 17.6%. Type III lip print pattern was present in 854 males or 34.2% and 257 females or 10.3%. Type IV lip print pattern was present in 610 males (24.4%) and 135 females (5.4%).

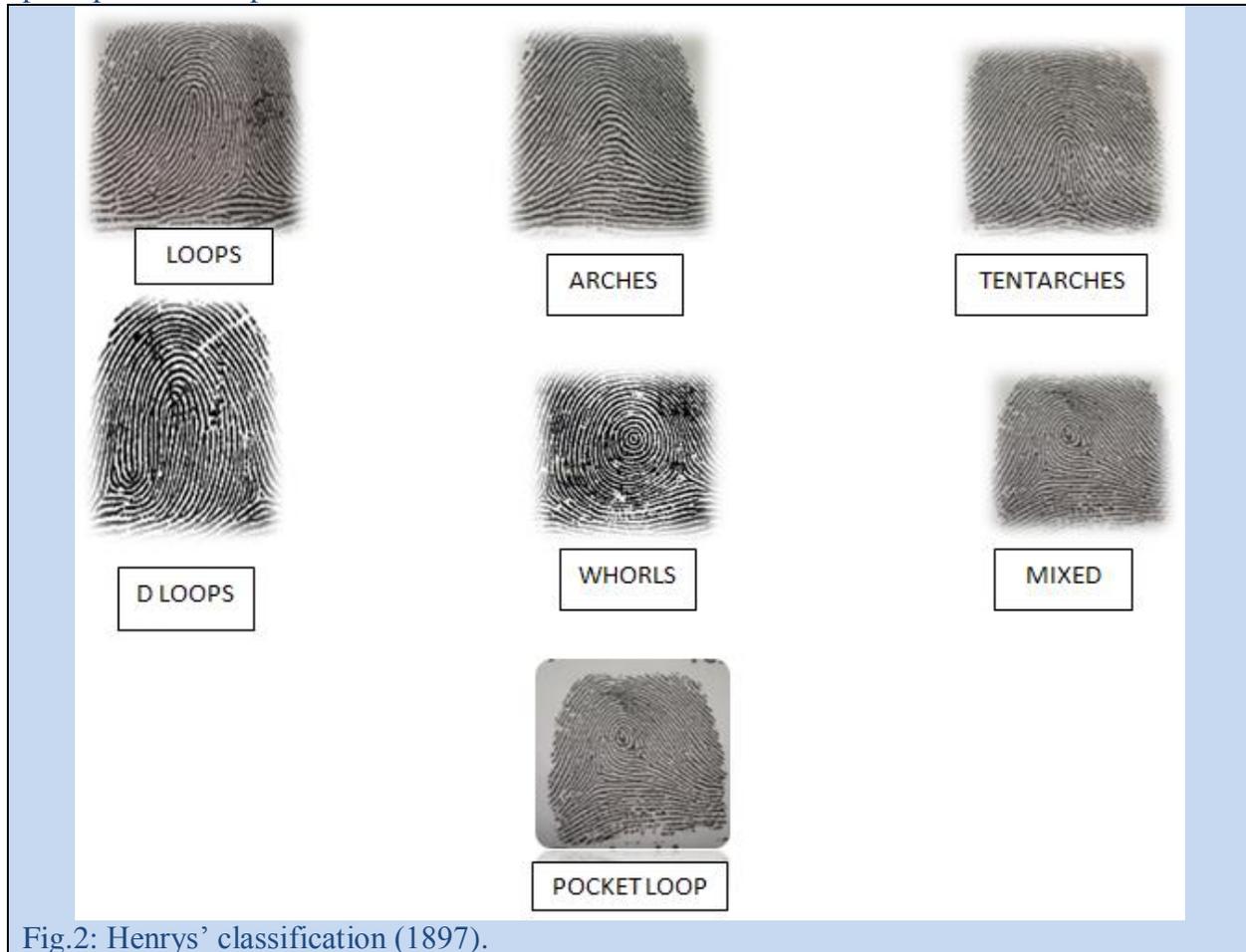


Fig.2: Henry's classification (1897).

In females, the highest incidence was Type I at 32.0%, with a p value less than 0.001, Type I' was present in 25.4% of the females, with a p value less than 0.001, Type II was present in 26.9% of the females, with a p value less than 0.001.

Thus it showed that the incidence of Type I, I' and Type II lip print patterns in females were statistically significant.

Among the males, the highest incidence was Type III at 34.2%, with a p value less than 0.001. Type IV was present in 24.4% of the males with a p value less than 0.001.

Thus it showed that the incidence of Type III and Type IV lip print patterns in males were statistically significant. Hence, it was concluded that Type I, I' and Type II lip

print patterns were predominant in females and Type III and Type IV lip print patterns were predominant in males.

The statistics seem poor. Only 56.6 % of males fall within Types III and IV, so 43.4% fall into the "female" group of Types I, I' and II; this seems a poor discriminator of the male sex.

The results showed that Loops finger print pattern was present in 63.4% of females and 42.2% of males. Whorls finger print pattern was present in 44.0% of males and 20.4% of females. Arches finger print pattern was present in 11.5% of females and 9.5% of males. Double loops finger print pattern was present in 3.7% of males

and 3.7% of female, showing that the Double loops finger print pattern distribution was equal in both the sexes. Pocket loops finger print pattern was present in 0.3% of females and 0.1% of males. Tent arches finger print pattern was present in 0.9% of females and 0.4% of males.

The sex wise distribution showed that among the females, the highest incidence

of finger prints pattern was of Loops pattern which was 7923 of 12500 at 63.4%, with a p value less than 0.001.

The sex wise distribution showed that among the males, the highest incidence of finger prints pattern was of whorls pattern which was 5499 out of 12500 at 44.0%, with a p value less than 0.003

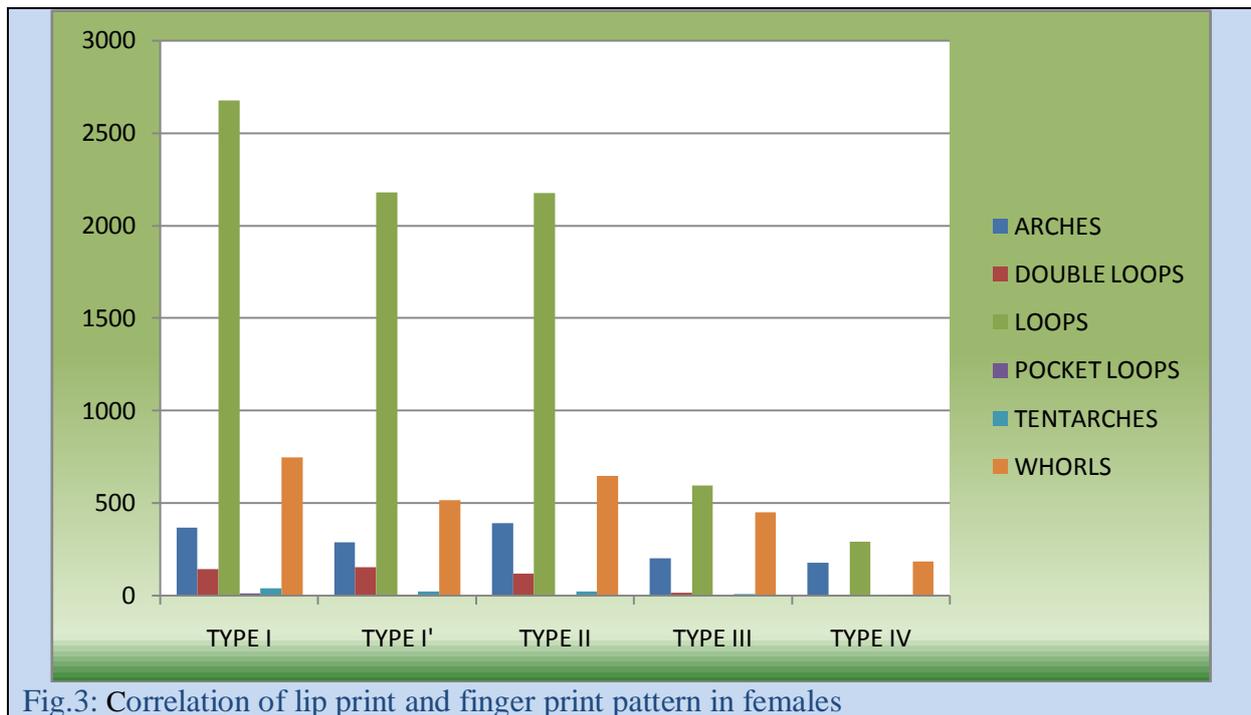


Fig.3: Correlation of lip print and finger print pattern in females

Among the sample of females, it was seen that the females with a predominant Finger Print Pattern of Loops and a predominant Lip Pattern of Type I numbered 2677 at 66.9%. Females with a predominant Finger Print Pattern of Loops and a predominant Lip Pattern of Type I' numbered 2179 at 68.6%. Females with a predominant Finger Print Pattern of Loops and a predominant Lip Pattern of Type II numbered 2175 at 64.6%. The p value was less than 0.0146 showing that these results were statistically significant (Fig 3).

Among the sample of males, it was seen that the males with a predominant Finger Print Pattern of Whorls had a predominant lip pattern of Type III with 2646 at 62%.

Males with a predominant Finger Print Pattern of Whorls had a predominant lip pattern of Type IV with 1845 at 60.5%. The p value was less than 0.0001 showing that these results were statistically significant (Fig 4).

DISCUSSION

Identification is necessary for many reasons such as personal, social and legal reasons, including certification of death.⁵ Historically, human identification is one of the most challenging subjects that has confronted man. The concept of identity is a set of physical characteristics, functional or psychic, normal or pathological, that defines individual.¹ Personal identification

is necessary for any unknown deceased person in cases of homicide, suicide, accident, mass disaster etc. It is also

necessary for locating living individuals who are missing or culprits hiding their identity.⁶

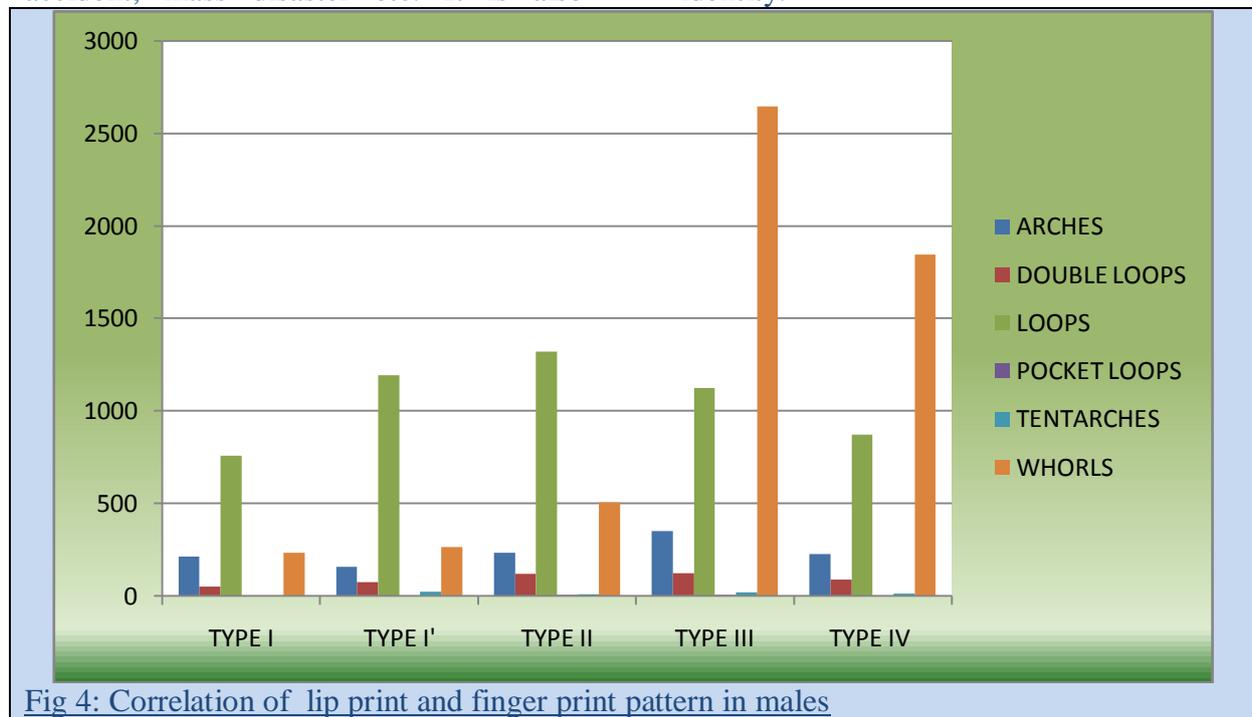


Fig 4: Correlation of lip print and finger print pattern in males

In the past, some researchers have worked on lip prints with the idea of proving that a gender difference does exist in lip print. According to a study by Sonal-Nayak, Type I and Type I' patterns were found to be dominant in females, while Type III and Type IV patterns dominant in males. In a study conducted by Dr. Harpreet Singh, Dr. Pankaj Chhikara et al in 2001, it was concluded that the Type II lip print pattern was most commonly seen in females, whereas Type IV lip pattern was seen most commonly in males. In another study by Gondivkar SM et al in 2009, it was concluded that in males, the predominant lip pattern was Type III lip print pattern, whereas in females, the predominant lip pattern was Type II lip print pattern.^{5,7}

In the case of finger prints are concerned, it was found that loops were more common in the females as compared to the males. In the males, whorls were significantly higher than in the females. This was in accordance with the study conducted by G.G Reddy et al in 1975.⁸

Similar results were obtained by Dr. Prateek Rastogi et al in 2010 and Muralidhar Reddy Sangam et al in 2009 in their studies.^{9,10}

In our study, it was found that in the females Type I lip print pattern, Type I' lip print pattern and Type II lip print pattern were most commonly associated with the loop finger print pattern. In the males, Type III lip print pattern and Type IV lip print pattern were most commonly associated with whorl finger print pattern.

But no study has previously been conducted to correlate the predominant lip print and finger print patterns as a tool in sex determination. This is the first such study done with such a large sample size in India

The most predominant lip print pattern was associated with the most predominant finger print pattern in both male and female groups. With the availability of lip and finger patterns and correlation of both the types, it is possible to determine the

gender of an individual in forensic investigations.

CONCLUSION

The correlation between lip print and finger print patterns would be helpful in various criminal cases, in law and justice. It can help in limiting wrong identifications and will act as an adjunct in forensic sciences.

Identification of an individual, living or dead is based on the theory that all individuals are unique. As more unique characteristics are noted, the comparison group becomes smaller until it reaches unity. At that point, identification can be made. Modern day criminal investigation has reached a point of sophistication requiring the involvement of many disciplines to solve a crime. Each discipline solves a part of puzzle until it is complete. It is important to understand what each forensic expert has to offer.

Many law enforcement agencies remain unaware of the usefulness of lip print and

finger print correlation when attempting to identify suspects, and as a result, important evidence is lost. With increasing numbers of unsolved crimes, the criminal justice community must look seriously at any new method that provides the evidence necessary to gain convictions. Law enforcement personnel should begin to consider correlation of lip print and finger print analysis as yet another tool to use for solving crimes.

If the sex of the individual is known, it is easy to short list the array of suspects with motive for the crime. The present study is able to convey that a correlation between lip prints and finger prints would be useful in forensic science for gender determination of an individual.

The result obtained by the present study does not prove to be an infallible method but it does seem to get one step closer to the truth. Although not a 100 % accurate method, the correlation can be used as a supplementary tool in sex determination.

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