

Research Article

Determination of Sex by Cheiloscopy as an Aid to Establish Personal Identity

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Abstract | Background: Establishment of individuality is the basic concept of the humanity, which formulates personal identity. Forensic medicine is basically the science of identification and during last few decades multiple research work has been conducted for detection of different methods of identification to establish a baseline of identity e.g. dental data, fingerprinting, DNA analysis, anthropometry, identification of sex, assessment of age, determination of height and blood groups identification. Among these, DNA analysis and dental data provide easiest identifications, however, these techniques are expensive and not readily available necessitating additional techniques for identification. One of such novel approach is cheiloscopy i.e. study of lip print patterns.

Methodology: In order to investigate the lip prints-based identification, a study was conducted in the Shai-kh Khalifa Bin Zayed Al-Nahyan Medical College, Lahore. A total of 125 female and 125 male student subjects were selected from all years of MBBS students Session 2016.

Results: After detailed study and evaluation of lip patterns of 250 subjects, 96 males and 105 females were correctly identified based upon lip prints.

Conclusion: Lip prints can and should be included in the forensic sciences as a means of establishment of individuality especially for criminals.

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Introduction

Establishment of individuality is the basic concept of the humanity that formulates personal identity. Identity is the actual thinking of a person regarding himself and it all depends upon the genetic make-up already built which unfold as the person grows up and this is also influenced by the environmental conditions⁽¹⁾. There are various parameters for establishing identity e.g. dental data, fingerprinting, DNA analysis, anthropometry, identification of sex, assessment of age, determination of height, blood groups

identification, which makes identification easiest⁽²⁾ but these techniques are not always available, are very time consuming, tedious and expensive. Identification from lip prints for determining sex is an easy, cheap and less time consuming approach. Both lips are having special ridges and grooves with special pattern for every individual and formulate a new and easiest way of identification⁽³⁾. Cheiloscopy is the study of lip prints and is very helpful in investigation of crime when no other trace evidences or parameters of identification are available or their analysis is very difficult. Lip prints were described and classified

according to Tsuchihashi's classification into Type I (complete vertical furrows) Type I' (incomplete vertical furrows) Type II (branching furrows) Type III (intersecting furrows) Type IV (reticular furrows) and Type V (undetermined grooves) ⁽⁴⁾ as shown in Figure 1 and 2.

Lip prints are such a great marker of identification, which can be identified as soon as the sixth intrauterine week. Once formed, lip prints patterns never change throughout life.⁽⁵⁾ The study of such important physical property bears real requirement in today's scenario of litigation, medico legal disputes and rising criminal activities among the population.⁽⁶⁾ Lip prints are very helpful in sex determination as they never change in life until very aggressive infliction⁽⁷⁾, they will be more helpful if special procedures for their lifting up are devised⁽⁸⁾

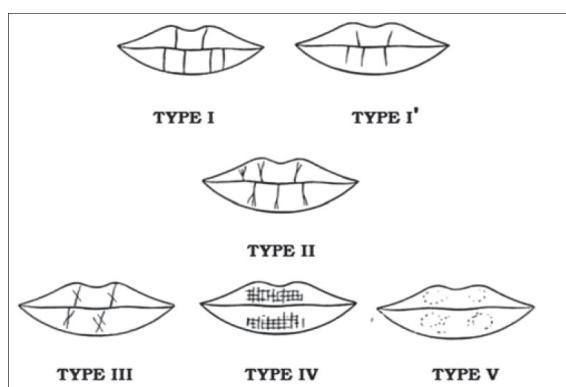


Figure 1: Lip print patterns according to Tsusihashi classification.

Material and Methods

In order to understand the practicality of lip prints-based individuality identification, a cross-sectional study was conducted at the Shaikh Khalifa Bin Zayed Al-Nahyan Medical College (SKZMC), Lahore.

The sample size was calculated by keeping confidence level of 95% with 5% relative precision and using expected frequency of correct identification of gender as 85%. Sample size was calculated as $n=165$ (minimum sample size). For the current study, a total of 250 students from all years of MBBS from first to final year and every second student was included in the study at Shaikh Khalifa Bin Zayed Al-Nahyan Medical College, Lahore.

Systematic sampling technique was adopted. SKZM-DC enrolls a total of 500 students in total consisting

of 250 males and 250 females and every second student was enrolled in the study i.e. 125 males and 125 females were enrolled in the study after taking written informed consent.

Type of Lip Print	Figure
Type I	
Type I'	
Type II	
Type III	
Type IV	
Type V	

Figure 2: Suzuki and Tsuchihashi's classification of lip print

All males and females students of MBBS 1st to final year classes of 2016, having no inflammatory lip disease, trauma, malformation, deformity and scar over lips were included.

All the students who were sensitive to lipstick and the students having any of the above stated lesions. Bond paper, dark red color lipsticks, lip brushes, cellophane tapes.

Collective briefing on the scope of the study was performed for all students and a consent form circulated among the students having all parameters of the study. The signed forms were used to evaluate the patterns and group lip prints in different types. Lip brushes were used to apply dark coloured lipstick and students were advised to give their prints over cellophane tape, which was pasted over bond paper, and the prints obtained were numbered with code numbers according to sex and names of individuals.

All collected data was entered in SPSS version 21. Percentages were calculated for categorical data (qualitative data e.g. gender and lip prints categories)

gender was nominal (dichotomies data) variable and percentages of male and females with different types of lip print patterns among them was calculated

Results

As shown in Table 1 and Figure 3, it is eminent that the most prominent pattern among both sexes was Type I i.e. vertical type having complete longitudinal grooves. Therefore, both male and female in study population i.e. 93/250 i.e. 37.2% were having type 1 pattern. Following this, the 2nd common pattern observed in the present study was type III i.e. 78/250 making 31.2% followed by type I' and type II formulating 31/250 and 30/250 making 12.4% and 12%, respectively. Type IV was the least common group having 15/250 students of both sexes forming 6%, and 3 lip prints remained unidentified either due to human error or due to wrong approach.

Table 1: Lip print patterns among study population.

Classifications	Frequency	Percent	Valid (%)	Cumulative (%)
I	93	37.2	37.2	37.2
I'	31	12.4	12.4	49.6
II	30	12.0	12.0	61.6
III	78	31.2	31.2	92.8
IV	15	6.0	6.0	98.8
Unidentified	3	1.2	1.2	100.0
Total	250	100.0	100.0	

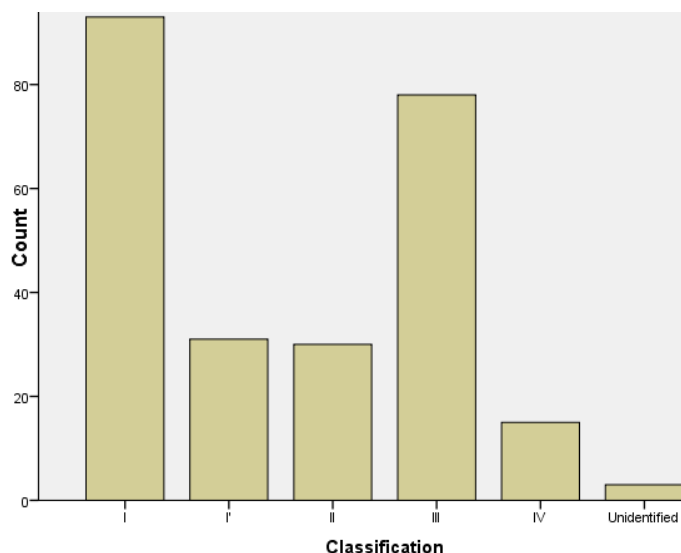


Figure 3: Different lip print patterns of study population

When codes were removed, it was observed that 105 females and 125 males having type I and I' i.e. 84%

having a significant number, while 96 out of 125 males were correctly identified as males formulating 76.8% showing that type II and type III were the most common pattern among male population as evident from Table 2 and Figure 4.

Table 2: Classification of lips prints according to sex

Sex	Classification						Total
	I	I'	II	III	IV	Unidentified	
Male	9	10	20	76	8	2	125
Female	84	21	10	2	7	1	125
Total	93	31	30	78	15	3	250

Type I pattern is most prominent in females; Type III pattern is most prominent among males

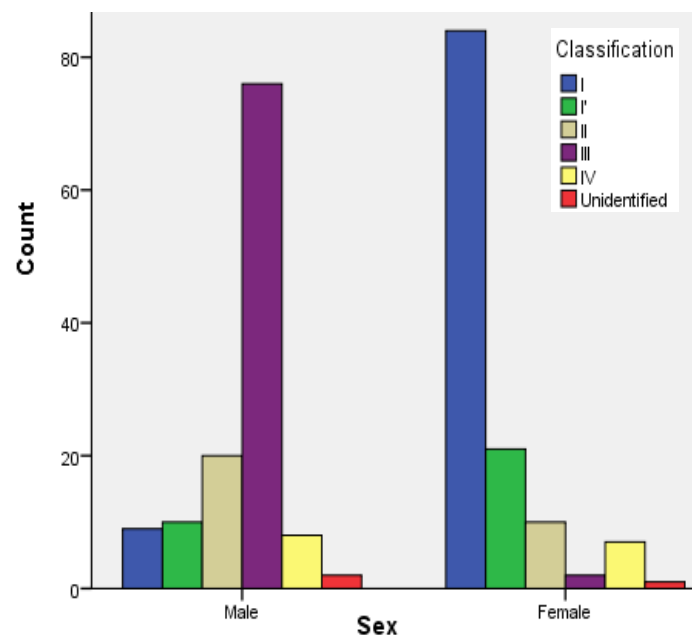


Figure 4: Lips prints according to sex

Discussion

Present study highlight that the lip prints is a meaningful tool for sex determination and individual identification. Previously lip prints were not given much importance and not tried to find out at crime scene as trace evidence and no crime scene investigator tried to find them. Criminals usually use glass to drink, smokes cigarette, use clothing or napkins and even skin of the victim of sexual assault may possess lip prints that can help the forensic experts as well as the investigating agencies to identify criminals, injured and eye witness of a criminal act.

After studying all the collected lip prints carefully, it was concluded that the pattern found predominantly in the total study population, taking both lips to-

gether, was Type I (37.2%), which is also found in study by Sharma et al.⁽⁹⁾ and also a study by Neeraj et al.⁽¹⁰⁾ and is contrary to the study of INDURKAR who showed type II as the most predominant pattern i.e. (28.59%). This was followed, in order, by Type III (27.89%), Type I (19.29%), Type I' (12.80%), Type IV (9.64%)⁽¹⁶⁾ and also Paul, Which states that in both sexes, type II (branched-34%) lip print was the most dominant pattern.⁽¹¹⁾

In males, Type III (70%) lip print patterns were most frequently found and this type was also most frequently observed in different studies conducted by Indurkar, Sonal Nayak and Nazir^(10,14) however, contrary from Sharma⁽¹²⁾ which shows type IV as most frequent pattern and second most pattern type III (10%) then type II (6%) also different from Paul⁽¹³⁾ study, which shows that, in males, Type I (complete vertical, 30%) was the most dominant type, followed by Type II (branched-26%), Type IV (reticular-16%), Type I' (incomplete vertical-14%), Type III (intersecting-8%) and Type V (irregular-6%), whereas Type I (70%) lip print pattern was most frequently found in females and second common pattern was type I' (15%). Same dominance is found in Sharma study⁽¹²⁾ and also in Sonal Nayak and Nazir H study⁽¹⁴⁾ but contrary to Indurkar study⁽¹⁰⁾ which states type II as the most frequent lip print pattern among females and also different from Paul study which shows

Variations in lip print patterns in different studies indicate the variation of lip prints depending upon different ethnic groups, highlighting the need of additional research in this field. Whenever there is a grave situation such as suicide, accident, and mass disaster several unidentified dead bodies warrant novel tools for individual identification. Adaptability and utilization of this approach will streamline the legal implication by the national courts.⁽¹³⁾ Lip prints hold a very high potential to sex of an individual. Until antemortem data is available, lip prints are very important for living individuals because they can distinguish individuals⁽¹⁵⁾.

Taken together, our findings led to the conclusion that lip print patterns show variation according to the gender.

Conclusions

It is concluded from the above study that:

- lip print pattern for every individual is variable and if we are able to identify lip prints at any scene of crime we can also identify the sex of individual and as the identification points are getting wider the possibility of identification of criminals is narrowed. However, it is such a wide area that additional research with large sample size needs to be conducted for accuracy.
- It is also concluded from the study that a very authenticated system is required for the proper collection, detection and evaluation of lip prints and for better comparison. This trace will be considered conclusive method of identification in court of laws.
- Therefore, it is suggested that lip prints can and should be included in the forensic sciences as a means of sex determination especially for criminals.

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