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Original Research Article

CHEILOSCOPY: A TOOL FOR SEXUAL DIMORPHISM IN INDIA.

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ABSTRACT

Background: Cheiloscopy is a Greek word derived from, 'cheilos' means lips, 'skopein' means to see, so the cheiloscopy is the study of lip print pattern in human beings. In forensic science, lip print pattern gives important information which help in sex determination.

Aim: This study is undertaken to evaluate the uniqueness of lip print for sexual dimorphism.

Material and methods: The study was conducted on 400 subjects (200 male and 200 female) among the population of India. Lipstick was applied on the lips and print was taken on bond paper, the prints were divided into four quadrants and were analyzed by using magnifying lens and another method was used in which lip print of the middle 10mm of the lower lip was analyzed and Suzuki and Tsuchihashi classification were used to identify the most common type of pattern among Indians for sexual dimorphism.

Result: our study shows that the most common type of pattern in Indian race in male was type III and in female were type II.

Conclusion: The present study reveals that, there was no similarity in the lip print pattern of one individual with that of the other individual. So, it can be used in sex determination by the forensic expert.

KEY WORDS: Cheiloscopy, Sexual Dimorphism, Indian Race, Tsuchihashi classification.

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INTRODUCTION

Cheiloscopy is a Greek word derived from, 'cheilos' means lips, 'skopein' means to see [1], so the cheiloscopy is the study of lip print pattern in human beings. Lip prints of human being are the elevated line and fissures, present between the area of outer skin and inner labial mucosa in the form of grooves and wrinkles [2]. In forensic science, lip print pattern gives important information which help in person's identification. The groove or elevation and depression present on human lips (sulci labiorum) are unique to each person [3] and can be used in person's identification. Fingerprints, post mortem reports and DNA fingerprinting are successfully used in identification of the

individual in the field of forensic science. Similarly the lip print pattern is also an important tool which helps in identification of the individual present at the site of crime [4].

In crime investigation identification of the victim is the key challenge for case. In crime cases if the lip print is found in any object such as it may be present in glasses or in any clothes as well as in any other places like cups, in cigarette butts, on mirror or any fibers, utensils then it is very useful for the investigator to investigate the case of crime.[5] The lip print which is found at the crime site and its analysis and comparing of the result with that of the suspect is extremely useful for the expert in identification and it also make the work easy for the expert to find the suspect of crime [6]. Dental pattern is also one of the most useful and frequently used method of identification predominantly by the comparison on ante mortem and post mortem records [7].

Various methodologies are used in forensic field to reveal the identity as well as sex which confined the identification process flawless. Wrinkles present on lip are the characteristic of each individual like fingerprint. Thus cheiloscopy is the method of human identification which is based on the arrangement of elevation and depressions present on lip. It is technique based on identification of lip traces [8]. In the field of forensic science, it has been emphasized that any evidences or any kind of examination that help to detect the criminal is very much useful for the investigator to solve the criminal cases and they can also utilize many processes which help them in their investigation and legal processing. Lip print is one of those evidences which are included in the criminal investigation process and it has been proved by the forensic expert that lip print can link the suspect and can also detect the criminal. This is the reason that why the expert give more emphasis to the field of cheiloscopy [9].

Classification of lip prints: The classifications are very useful to divide the lip prints into different category and limited the range for any investigating process. An organized database can also made for retrieving information with the help of classification. It is also used for comparison [10]. There are various scientist who had given classification and these are as follows:

1] Marty'n Santos classification

2] Suzuki and Tsuchihashi classification

3] Renaude classification

4] Afchar-Bayat lip prints classification

5] Jose Maria Dominguez classification

6] Individual features of line pattern on red part of lips

Among them the most accepted classification is of Suzuki and Tsuchihashi for sex determination and it is as follows:

1. Type I: complete vertical groove i.e. run across the entire lips.

2. Type I': incomplete vertical groove i.e. do not cross the entire lips.

3. Type II: branched (y- shape)

4. Type III: intersected grooves.

5. Type IV: reticular grooves.

6. Type V: undifferentiated.

Scope of cheiloscopy:

Many forensic scientist had worked on the lip prints and after their research they concluded that, lip prints are used as a good evidences in any crime investigation as well as for comparison and analysis of person with the help of their known lip prints, those who were present at the site of crime and they got a positive correlation. So, it is needed in forensic odontology to develop a new system related to cheiloscopy and its practical use and correlation between them [11].

We know that the lip prints are used in person's identification and also used as an evidence for any crime investigation. Apart from these use, the lip prints can also used for detection work, to get information of a criminal etc. If the lip prints present at the site of crime, it give many information like, how many people are involved in the criminal events, their sexes, their habits and they have any pathological disorder or not [11,12].

It is really very difficult to trace the lip prints in any uneven surface, so to reveal the uniqueness of lip prints it should be taken in smooth and stratified surface. Only that case the groove and fissure of lip prints are clearly visible [12].

MATERIALS AND METHODS

The present study was carried out on 400 subjects (200 male and 200 female) among Indian population. The lip print of all the subjects was taken and subsequently analyzed with the help of magnifying lens. The lip print pattern was classified according to the classification given by Suzuki and Tsuchihashi. Then the data was collected and analyzed statistically to find the difference between the lip print of male as well as of female.

Technique for taking the lip print: For the lip prints the subjects were asked to sit and then lipstick was applied gently on the lips and then the subjects were asked to rub their lips for equal spreading of lipstick. Then a strep of cellophane tape was taken and the glued surface of the cellophane tape was pasted on the lips of the subject. Then the tape was carefully lifted from the lips from one end to other. Then the tape was pasted on a bond paper for permanent record (Figure 1 to 3).

Fig. 1: Rolling of lips to spread the lipstick.

Fig. 2: Impression on Glued surface of Cellophane tape.

Fig. 3: Impression of lip print on bond paper.

Fig. 4: Division of lip print into four quadrant.

Fig. 5: Middle 10 mm of Lower lip for sex determination.

Technique for identification of lip print pattern: Two methods are used for identification of the lip print pattern:

Quadrant method: The lip prints were divided into four quadrants by a horizontal and a vertical line. The vertical line passes from middle of the frenulum and divide it into equal right and left halves. The horizontal line divides the upper lip from the lower lip. The right upper half taken as first quadrant left upper half taken as second quadrant, lower left half taken as third quadrant and lower right half taken as fourth quadrants. The lip prints were observed by using magnifying lens and were categorized into particular type depending upon the predominant pattern (Figure 4).

Middle 10mm of the lower lip was selected and identified with the help of magnifying lens for sex determination (Figure 5).

Then the lip print patterns were classified as per Suzuki and Tsuchihashi classification [1] which states that

1. Type I: complete vertical groove i.e. run across the entire lips.

2. Type I': incomplete vertical groove i.e. do not cross the entire lips.

3. Type II: branched (y- shape)

4. Type III: intersected grooves.

5. Type IV: reticular grooves.

6. Type V: Undifferentiated.

Statistical Analysis: All the data collected was analyzed by using Chi-square test. Chi-square test has been used to test for association between the variables. A p-value of <0.05 was considered significant for all analysis. The z-test was applied to test the significant difference between males and females for different types of lip print pattern.

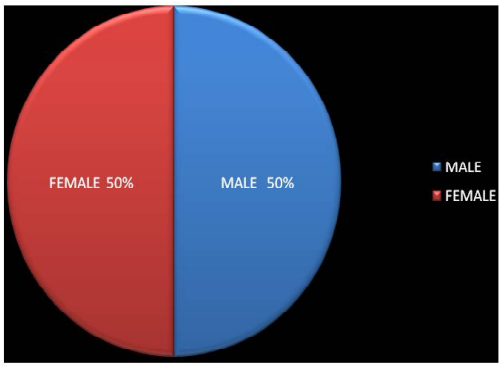
RESULTS

The present study was conducted on 400 subjects (200 male and 200 female) among population of India. This study includes both the sexes. The lip prints of all subjects were taken and the statistical analysis was done by the chi-square test to compare the proportions.

Table 1: Gender distribution of the total sample.

GENDER	NUMBER	PERCENTAGE (%)
Male	200	50
Female	200	50
Total	400	100

Graph 1: Pie chart showing the gender distribution of all sample.



*represent the level of significant.

Table 2 Shows that in quadrant I, on comparing the type I pattern in males and females the Z-value is 8.02 and the P-value is (<0.05) which is statistically significant, on comparing the type I' pattern in males and females the Z-value is 15.61 and the P-value is (<0.05), the Z-value of type II is 16.79 and the P-value is (<0.05), the Z-value of type III is 13.56 and that of type IV and type V is 10.87 and 19.22 and the P-value is (<0.05), which is statistically significant (Graph 2).

Table 2: Showing statistical description of all the lip print pattern between male and female in quadrant I.

LIP PRINT PATTERN	MALES		FEMALES		Z-VALUE	P-VALUE
	NO.	%	NO.	%		
TYPE I	11	5.5	29	14.5	8.02	<0.05*
TYPE I'	13	6.5	41	20.5	15.61	<0.05*
TYPE II	38	19	76	38	16.79	<0.05*
TYPE III	67	33.5	34	17	13.56	<0.05*
TYPE IV	31	15.5	10	5	10.87	<0.05*
TYPE V	40	20	10	5	19.22	<0.05*

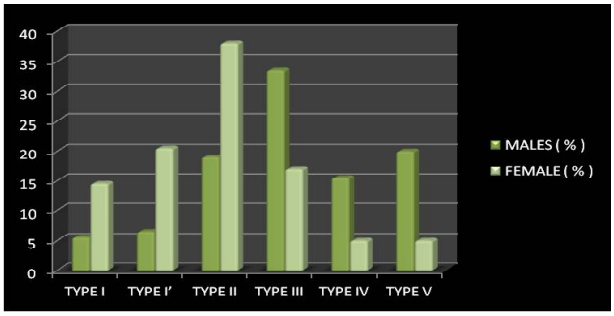
Table 3: Showing statistical description of all the lip print pattern between male and female in quadrant II.

LIP PRINT PATTERN	MALES		FEMALES		Z-VALUE	P-VALUE
	NO.	%	NO.	%		
TYPE I	10	5	28	14	8.4	<0.05*
TYPE I'	21	10.5	11	5.5	2.75	>0.05*
TYPE II	33	16.5	72	36	18.64	<0.05*
TYPE III	84	42	39	19.5	22.72	<0.05*
TYPE IV	11	5.5	32	16	10.42	<0.05*
TYPE V	41	20.5	18	9	9.62	<0.05*

*represent the level of significant.

Table 3 Shows that in quadrant II, on comparing the type I pattern in males and females the Z-value is 8.40 and the P-value is (<0.05) which is statistically significant, on comparing the type I' pattern in males and females the Z-value is 2.75 and the P-value is (>0.05), which is statistically non significant, the Z-value of type II is 18.64 and the P-value is (<0.05), the Z-value of type III is 22.72 and that of type IV and type V is 10.42 and 9.62 and the P-value is (<0.05), which is statistically significant (graph 3).

Graph 2: Comparison of lip print between male and female in quadrant I.



Graph 3: Comparison of lip print between male and female in quadrant II.

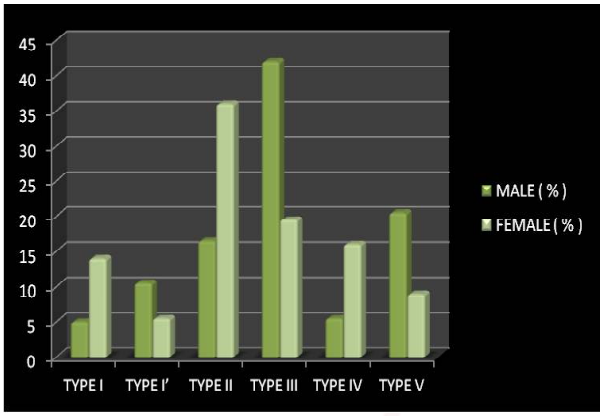


Table 4: Showing statistical description of all the lip print pattern between male and female in quadrant III.

LIP PRINT PATTERN	MALES		FEMALES		Z-VALUE	P-VALUE
	NO.	%	NO.	%		
TYPE I	12	6	35	17.5	11.66	<0.05*
TYPE I'	15	7.5	38	19	10.52	<0.05*
TYPE II	29	14.5	60	30	13.01	<0.05*
TYPE III	78	39	37	18.5	19.52	<0.05*
TYPE IV	31	15.5	14	7	6.41	<0.05*
TYPE V	35	17.5	16	8	7.28	<0.05*

*represent the level of significant.

Table 4 Shows that in quadrant III, on comparing the type I pattern in males and females the Z-value is 11.66 and the P-value is (<0.05) which is statistically significant, on comparing the type I' pattern in males and females the Z-value is 10.52 and the P-value is (<0.05), which is statistically significant. The Z-value of type II in quadrant I is 13.01 and the P-value is (<0.05), which is statistically significant, the Z-value of type III is 19.52 and the P-value is (<0.05), which is also statistically significant. The Z-value of type IV and type V is 6.41 and 7.28 and the P-value is (<0.05), which is statistically significant (Graph 4).

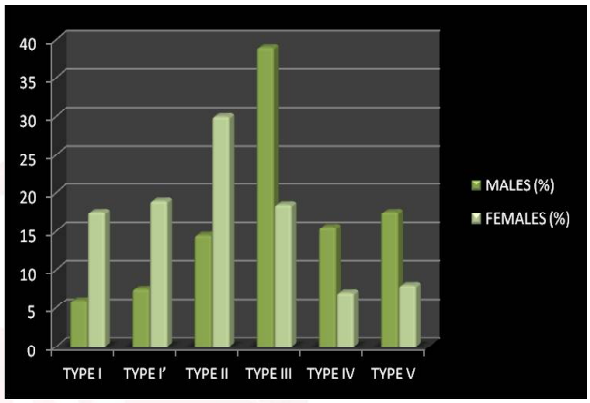
Table5: Showing statistical description of all the lip print pattern between male and female in quadrant IV.

LIP PRINT PATTERN	MALES		FEMALES		Z-VALUE	P-VALUE
	NO.	%	NO.	%		
TYPE I	15	7.5	35	17.5	8.25	<0.05*
TYPE I'	14	7	37	18.5	10.87	<0.05*
TYPE II	34	17	67	33.5	13.56	<0.05*
TYPE III	70	35	30	15	20.28	<0.05*
TYPE IV	37	18.5	17	8.5	7.79	<0.05*
TYPE V	30	15	14	7	5.74	<0.05*

*represent the level of significant.

Table 5 Shows that in quadrant IV, on comparing the type I pattern in males and females the Z-value is 8.25 and the P-value is (<0.05) which is statistically significant, on comparing the type I' pattern in males and females the Z-value is 10.87 and the P-value is (<0.05), which is statistically significant, the Z-value of type II is 13.56 and the P-value is (<0.05), the Z-value of type III is 20.28 and that of type IV and type V is 7.79 and 5.74 and the P-value is (<0.05), which is statistically significant (Graph 5).

Graph 4: Comparison of lip print between male and female in quadrant III.



Graph 5: Comparison of lip print between male and female in quadrant IV.

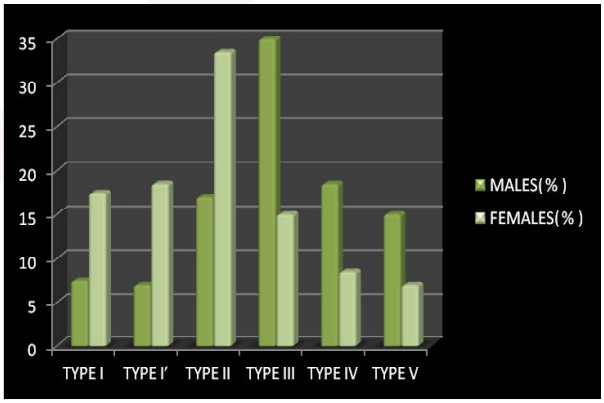


Table 6: Showing statistical description of all the lip print pattern between male and female in middle 10mm of lower lip.

LIP PRINT PATTERN	MALES		FEMALES		Z-VALUE	P-VALUE
	NO.	%	NO.	%		
TYPE I	38	19	17	8.5	8.43	<0.05*
TYPE I'	23	11.5	15	7.5	1.42	>0.05*
TYPE II	33	16.5	66	33	13.74	<0.05*
TYPE III	64	32	26	13	19.62	<0.05*
TYPE IV	20	10	36	18	4.67	<0.05*
TYPE V	22	11	40	20	5.51	<0.05*

*represent the level of significant.

Table 6 Shows that in middle 10 mm of lower lip, on comparing the type I pattern in males and

females the Z-value is 8.43 and the P-value is (<0.05) which is statistically significant, on comparing the type I' pattern in males and females the Z-value is 1.42 and the P-value is (>0.05), which is statistically not significant, the Z-value of type II is 13.74 and the P-value is (<0.05), the Z-value of type III is 19.62 and that of type IV and type V is 4.67 and 5.51 and the P-value is (<0.05), which is statistically significant.

Among male and female all the types of lip print pattern and their distribution in different quadrants as well as in middle 10 mm of lower lip were compared and the difference was found statistically significant p (<0.05).

In middle 10 mm of lower lip,

The most common type of pattern in male was **TYPE III (32%).**

The most common type of pattern in female was **TYPE II (33%)**.

DISCUSSION

Sex determination is one of the important and challenging acts now a day. The pre-requisite criteria for any social or legal reason are to identify the individuality as well as sex of the person. Lip print is very important tool present for personal identification and sex determination in any criminal investigation cases. Presence of lip print in any crime site can give a evidence related to the suspect, it can also give information about the number of people present at the site of crime [2,3]. Like fingerprint lip print is also used as a evidence in criminal investigation cases and also in personal identification [11].

The present study was conducted on 400 subject (200 male and 200 female) among Indian population. The lip print were taken and analyzed to the most common type of pattern in male and females.

Different study gives different opinion about the lip print pattern among the males and females. In the present study we have used two methods to identify the commonest type of lip print pattern in male as well in female. One is the quadrant methods in which the lip prints were divided into four different quadrants and each quadrant was analyzed separately among male and females. After the analysis it was noticed that no two or more than two individual have similar type of lip print which means lip print is an important and unique feature of an individual. In the second method the middle 10mm of the lower lip was selected and analyzed and it was observed that the common pattern in male and female was different. Similar type of observation was reported by many other workers like William et. al.[13], Sharma et. al., [14], Kasprzak et. al. [11], Vahanwala et. al., [15], Jaishankar et. al., [16], Saraswati et. al., [2] Patel et. al., [17], Narang et. al. [18].

Table 7: Showing the comparison of common lip print pattern in males and females between the present study with the previous studies.

S.NO	PREVIOUS STUDY	YEAR	LIP PRINT PATTERN
1	Vahanwalla et al [15]	2000	Males – type III Females – type I
2	Augustineet et al [19]	2008	Males and females – type III
3	Sharma et al [14]	2009	Males – type IV Females – type I
4	Gondivkar et al [20]	2009	Males and females – type II
5	Saraswathi et al [2]	2009	Males and females – type III
6	Bindal et al [21]	2009	Males and females – type II
7	Present study	2016	Males – type III Females – type II

In the present study in quadrant I the most common type of pattern in male was type III (33.5%) and in females the most common type of pattern was type II (38%). In quadrant II the most common type of pattern in male was type III (42%) and in females the commonest pattern was type II (36%). In quadrant III the most common type of pattern in male was type III (39%) and in female the most common type was type II (30%). In quadrant IV the most common type of pattern in male and female was type III (35%) and type II (33.5%). Saraswathi et al[4] , Nagrala et al[7] shows the same type of lip print pattern in their study.

Lip Print Pattern Obtained From the Previous Study

S.NO	PREVIOUS STUDY	YEAR	LIP PRINT PATTERN
1	Babu et al [22]	2009	Males – type IV Female – type I
2	Patel et al [17]	2011	Males – type I Females – type II
3	Venkatesh et al. [23]	2011	Males – type II Females – type II
4	Gupta et al [3]	2011	Males – type II Females – type III
5	Bajpai et al [24]	2011	Males – type III Females – type III
6	Present study	2016	Males – type III Females – type II

In the present study the lip print has shown variation and no two or more lip print matches with each other which show that lip print is unique for each and every individual and can be used in sex determination.

CONCLUSION

In the present study, 200 males and 200 females was positively positively identified. It was concluded that among the 200 males Type III pattern was the most common, and among 200 female Type II pattern was the most common.

The present study also reveals that, there was no similarity in the lip print pattern of one individual with that of the other individual. The lip print pattern varies between the same age group people as well as among the population of same region as well as same sex. From the observation it can be concluded that lip print can be used as a key tool in sexual dimorphism and it can be useful for the forensic investigator to investigate any criminal cases.

Conflicts of Interests: **None**

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