Original Research Article

Sexual Dimorphism by Morphometry of Lip Prints in Adult Population of Southern Rajasthan

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Abstract

Background: Cheiloscopy is the study of lip prints. This field has proven that lip prints are unique to individuals and can be used as a tool for identification. However, lip morphology as an identifier needs to be probed further. **Aim:** The present study was formulated with an opinion to understand whether lip sizes can be used as gender identifiers. **Methodology:** The study involved a pool of 30 subjects who were equal in gender distribution. The sample was subjected to collection of lip prints and resulting data was analyzed in consultation with institutional statistician. **Observations:** The results showed that lip sizes showed a definitive variance between males and females in a manner which was statistically significant. **Conclusion:** The study concluded that in a comparative role, lip prints can be used to identify males and females but a larger study is needed to confirm the hypothesis.

Keywords: Lip Prints, Gender Determination, Morphology.

Introduction

Identity establishment in judicial matters is pertinent for administration of justice and one of the various data for identification involves the identification of lip prints and morphology. The lip prints found on glasses or on other surfaces are regarded as latent evidence that can help in identification or exclusion of suspects in a criminal matter[1].

In terms of anatomy, the exclusivity of lip prints is seen and has been documented in various studies across the globe. They also possess the unique capability to retain shape even after trauma provided the trauma is not extensive[2].

Cheiloscopy as a science has deciphered that pattern exist on surface of lips that can be classified and differentiated to render them as identification markers. The same cannot be definitively stated in terms of the morphometric parameters of lips as studies are contradictory in nature on the value of gender determination[3].

Similar to anthropometry, lip morphology may also yield a clue to identity as well as gender determination in human subjects. The present study was designed with the objective to assess if morphometric analysis of lip prints can effectively aid in gender determination among the selected study population.

Methodology

The present study was a prospective observational randomized cross-sectional study conducted at Geetanjali Medical College and Hospital, Udaipur as part of a research thesis. The subjects were adult individuals with no evident lip deformities or afflictions. They were explained the need for the study and written informed consent was obtained from the subjects in a language of their understanding. The lip prints were recorded by using a non-glossy, non-glossy red colored lip stick on a white paper. The measurements included length of lip, width of upper lip and width of lower lip (Fig 1).

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Morphological types as proposed by Indra and Bhasin and anthropometric measurements of lips will also record. For the purpose of the measurement simple ruler scale will be used and the measurements of the prints and of the subject will be taken. Care will be taken that the lips remain relax and in normal shape and size. Each measurement will be repeated three times to avoid any errors. Following are the anthropometric measurements taken:

Height of Upper Membranous Lip: from tubercle of philtrum to midpoint of oral fissure (in mm).

Height of Lower Membranous Lip: from the center of vermilion border of lip to the midpoint of oral fissure (in mm).

Width of Lips: the shortest distance between the tips of angles of mouth when mouth is gently closed (in mm).

The demographic data of subjects and measurements of lip prints were recorded in a MS office Excel Sheet and subjected to statistical analysis involving central tendency and level of significance. Institutional ethical approval was obtained prior to starting of the study.

Fig 1: Collection of Lip Size

Results

The subject pool was involving 30 subjects which included 15 each of male and female participants. The mean age of the entire subject group was 35.3 years with a range between 18-44 years. Males had an

average age of 38.1 years while females had a mean age of 29.45 years.

The educational level was above high school in all the subjects with 26 % (n=8) subjects possessing a graduation degree. All the subjects were resident in Udaipur District of Rajasthan.

The mean length of lips in the entire subject population was 4.97 ± 0.56 cms. In males the lip length was marginally higher with a mean value of 5.01 ± 0.24 cms, while females had a marginally lower mean length at 4.34 ± 0.66 cms. (Table 1)

Comparative assessment using analysis revealed a statistically significant value of difference between males and females in terms of total lip length, with a p value <0.05 at 95 % confidence interval.

The mean width of upper lips in males and females also showed variance holding values of 2.48 ± 0.67 and 2.11 ± 0.22 respectively. The difference was statistically significant at 95 % confidence interval.

The values of lower lip width in males and females showed minor deviation with values of 2.79 ± 0.34 and 2.66 ± 0.14 respectively. Here no statistically significant difference was observed in males and females.

The observation yielded a result that when a full lip print is available, it is possible to differentiate between males and females using the above, however incomplete lip prints may prove difficult in comparative assessment. We also see that upper lip print measurement shows significant difference between male and females as compared to lower lip.

Table 1: Tabulation of Morphometric Data

Gender	Total number	Mean age	Mean length of lips	Mean width of upper lip	Mean width of lower lip
Male	15	38.1 years	5.01 ± 0.24 cms	2.48 ± 0.67 cms	2.79 ± 0.34 cms
Female	15	29.45 years	4.34 ± 0.66 cms	2.11 ± 0.22 cms	2.66 ± 0.14 cms
p- Value	NS	NS	<0.05	<0.05	NS

Discussion

The present study was conducted with an objective to provide an understanding on whether morphology and size of lip prints can be used in determining the gender of an individual. We observed that males had generally wider and larger lips as compared to females in the present sample. The analysis revealed a statistically significant difference in two out of three measurements. The upper lip and total length showed variance which was holding a significance at 95 % confidence interval.

It was reported in a study by Goncalves RD et al stated that lips have a genetic predilection towards genders and are seemingly larger in males possibly due to activity of testosterone and somatotrophic hormones. The converse length in females was shorter throughout the duration of life[4].

It was also seen in another study by Sforza C et al that Mouth width, width of the philtrum, total lip height, and lip volumes were significantly larger in men than in women ($p < 0.01$), increased with age ($p < 0.001$), and had age × sex interactions ($p < 0.001$). Vermilion areas and heights of the lower and total lips progressively increased with age until late adolescence, and then decreased with aging ($p < 0.001$). The vermilion height-to-mouth width ratio was larger in women than in men ($p < 0.001$) and decreased with age ($p < 0.001$). This is in concurrence with our study as we determined a difference in size in lip dimensions as being larger in males as compared to females[5].Ferrario VF et al conducted a anthropometric analysis on lip dimensions and stated that mean length and thickness of lips in men was higher as compared to females and that mean width of lower lip was higher than upper lip in both genders. This is in concurrence with our study. However, the author reported that the lower lip dimensions were comparable between males and females. This is also in concurrence with our study, however the aspect of similarity in volumetric analysis was missing from the present study[6].

Samal A et al, and Little AC et al conducted study on morphometric analysis of facial features i.e. head, eyes, orbits, nose, lips, and mouth, and ears which showed statistical difference between adult males and females. This is in concurrence with our study that found the same[7,8].

Ayuba JT et al, conducted a study on lip dimensions among various populations in Uganda, Somalia and Kenya and concluded that there was a statically significant difference in lip prints between males and females in their respective subgroups. The study concluded that lip morphology can change and aid in gender determination[9].

This lends credence to our assessment that males and females can offer distinct lip morphometry in the selected population subgroups.

Conclusion

The authors concluded that lip morphology can aid in determining the gender of an individual. The comparative assessment can prove beneficial in criminal investigative specialties. Further research can be done by employing a larger sample size with a wider demographic diversity. This will aid in further determining if the result of the present study is effectively representing the broad sample or not.

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