British Journal of Medicine & Medical Research
10(3): 1-6, 2015, Article no.BJMMR.18969
ISSN: 2231-0614

SCIENCEDOMAIN *international*
www.sciencedomain.org

Use of Cheiloscopy as a Tool for Gender Dimorphism in a Rural Indian Population

Ahmad Naeem[1*], Ali Mariyam[1], A. K. Verma[1] and Kumar Pankaj[1]

[1]Department of Prosthodontics, CPGIDS, Lucknow, India.

Authors' contributions

This work was carried out in collaboration between all authors. Author AN conducted the study. Author AM did proof reading. Author AKV helped with preparing the whole study and author KP helped with patient motivation and sample collection. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2015/18969
Editor(s):
(1) Emad Tawfik Mahmoud Daif, Professor of Oral & Maxillofacial Surgery, Cairo University, Egypt.
Reviewers:
(1) Geoffrey H. Sperber, University of Alberta, Edmonton, Canada.
(2) Maen Mahfouz, Orthodontics and Pediatric Dentistry Department, Arab American University Jenin, Palestine.
(3) Manas Bajpai, Department of Oral Pathology and Microbiology, N.I.M.S Dental College Jaipur, India.
(4) L. H. Adamu, Anatomy, Bayero University, Kano, Nigeria.
Complete Peer review History: http://sciencedomain.org/review-history/10403

Original Research Article

Received 19th May 2015
Accepted 23rd July 2015
Published 4th August 2015

ABSTRACT

Introduction: The uniqueness of human lip prints can be used for gender dimorphism. Cheiloscopy is an investigational technique under forensic science that deals with the study of uniqueness of lip prints. It has already been established that lip prints are unique to each individual; its comparison at the crime site with that of the suspect might be helpful.
Aims and Objectives: The specific aim of this study was to study the lip prints as a tool for gender dimorphism while the specific objective was to evaluate the uniqueness of lip prints.
Materials and Methods: The study was conducted on a group of 60 Dental students within the age group of 18 to 25 years. The pattern of lip prints was recorded by two methods and classified according to Suzuki and Tsushihashi's classification. Data was analyzed using SPSS package (version 12) and Chi square test was used to analyze and compare the lip print patterns.
Results: It was seen that no two lip prints matched with each other. Type I and I' pattern was seen only in females; type II pattern showed almost equal distribution between males and females whereas type III, IV was predominant in males. None of the subjects presented with Type V.

**Corresponding author: Email: naeem_bds@yahoo.co.in;*

Conclusion: It was concluded that cheiloscopy can act as a tool for gender dimorphism and both methods of recording lip prints were equally accurate.

Keywords: Cheiloscopy; lip prints; identification; sex determination.

1. INTRODUCTION

Establishment of a person's individuality is of significance for legal as well as humanitarian purpose and gender determination is an essential step in identifying an individual. Many methods are being used for this purpose like DNA analysis, dental assessment, finger printing. However as they cannot always be used, so there is a need for a reliable alternative method for establishing identity [1]. Similar to finger, palm and foot prints, lips possess furrows and grooves that can be classified into various types for identification purposes. The grooves present on lips are unique to an individual and hence can be used as a tool for identification process. The study of these grooves of furrows present on the red part of the lips is known as Cheiloscopy. Earlier studies have clearly shown that the lip prints can be used for personal identification as well as determination of sex [2]. R. Fischer an Anthropologist was the first to describe these groves and fissures in 1902 [3]. In 1932, Edmond Locard acknowledged the importance of Cheiloscopy [3]. In 1950, Le Moyer Snyder mentioned in his book 'homicide Investigation' about the possibility of using lip prints in human identification [3].

During identification, the mucosal area of the lips is of utmost value. This area also known as Klein's zone, is covered with wrinkles and grooves that forms a characteristic pattern 'the lip print' [4]. Lip prints are unique to one person, except in monozygotic twins. Like fingerprints and palatal rugae, lip grooves are permanent and unchangeable.

Lip prints are considered to be the most important forms of transfer evidence and are analogues to fingerprints. The presence of lipstick stain on a suspect's clothing can be considered as an indirect evidence of a relationship between the suspect and the cosmetic using victim. Lip prints can be used to verify the presence or absence of a person from the crime provided there has been consumption of beverage, drinks, usage of cloth, tissue/ napkin etc at the crime scene. Smears can also be found in other places such as cups, spoons or cigarette butts. The middle 10 mm wide part of the lower lip is almost always visible in traces. The determination of the pattern depends on the numerical superiority of properties of the lines on the segment [5].

The present study was conducted as the previous studies have not conclusively differentiated lip print patterns between genders. Due to lack of studies in this regard, an investigation was hence carried out to find out the predominance of lip print patterns between males and females.

Hence the specific aim to evaluate the predominant pattern of lip print by using two different methods and specific objective was to study the uniqueness of lip prints.

2. MATERIALS AND METHODS

2.1 Instruments

The materials used in the present study are dark colored lipstick, cellophane paper**,** bond paper, cello tape, microscope glass slide, fine black carbon powder (No.2015), ostrich feather brush, ear buds, scissors, magnifying lens, sanitary tissues (to wipe the lip stick) and proforma for recording lip prints.

Fig. 1. Materials used for study

2.2 Inclusion Criteria

Subjects willing to participate in the study and providing informed consent. Subjects free from any active or passive lesions on their lips.

2.3 Exclusion Criteria

Gross deformities of lips like cleft lip, ulcers, traumatic injuries on lips, known allergy to the lip stick used and male participant with excessive moustaches.

2.4 Subjects

The study was conducted on a group of 60 Dental students of Career Post Graduate Institute of Dental Sciences, Lucknow within the age group of 18 to 25 years.

The subjects were divided in two groups, Group A and Group B. Each group contains 30 males and 30 females. The subjects were made to sit on the dental chair in a relaxed position.

2.5 Analysis of Lip Prints

The lower lip was selected for study as it has a larger surface area and also is the first to come in contact with the surface. It is also established that on a particular lip (upper or lower) more than one class of prints can be found. Hence the lower lip was divided into three equal parts or compartments before classification. The middle third section of the lower lip was selected and all the patterns were counted. The majority groove pattern determined the classification type. To eliminate the inter-examiner bias, all the samples were taken by a single researcher and analyzed [6].

2.6 Ethical Approval

A statement of ethical approval from Research cell of Institutional ethical committee was taken to conduct the present study.

2.7 Informed Consent

An informed consent from all the subjects participating in the present study was taken.

2.8 Collection of Lip Prints

Two methods were used to record the lip prints.

2.8.1 Method 1

Lipstick was applied to the lips of the subject in a single stroke then, a cellophane paper was applied over the lips and lip prints were recorded on the cellophane paper. This cellophane paper was placed over the bond paper and a sticking cello tape was applied over it. The print was then studied using a magnifying glass under bright light (Fig. 3).

2.8.2 Method 2

Latent lip prints are taken on a clean and dry microscopic glass slide in a single motion without applying anything. They are developed by sprinkling black carbon powder using an ostrich brush. Any excess carbon powder was dusted off and a cello tape was placed on top of the glass slide. Then using a magnifying glass, the lip prints were studied in bright light (Fig. 4).

Lip prints obtained by both the methods are classified according to Suzuki and Tsuchiashi classification [7].

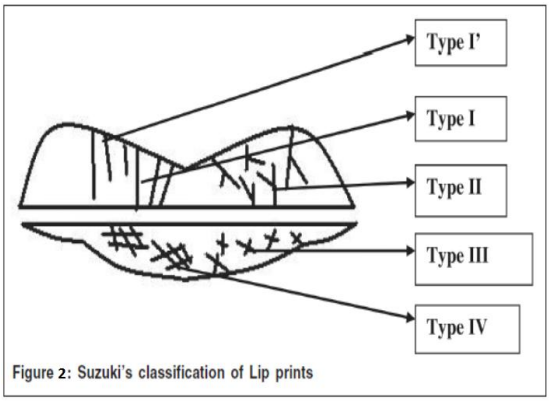

Fig. 2. The five different types of grooves are as follows:
Type I complete vertical; Type I, Incomplete vertical; Type II Branched; Type III Intersected; Type IV Reticular pattern; Type V Irregular

Fig. 3. Lip print using lipstick method

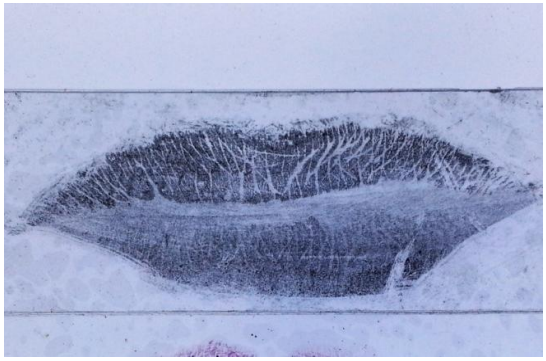

Fig. 4. Lip print using graphite method

2.9 Statistical Analysis

All the data was entered in Microsoft excel and analyzed using SPSS package (version 12). All the data was presented as frequency and percentages. Chi square test was used to analyze and compare the lip print patterns. The level of significance was set at PD 0.05.

3. RESULTS

No two lip prints matched with each other, thus establishing the uniqueness of the lip prints. The Type I pattern was seen predominantly in females by both methods.

Type I' pattern was seen only in females by both methods. Type II pattern was equally seen in males and females. Type III pattern and IV pattern was prominently seen in males than females. Type V pattern did not show any significant difference in males and females (Tables 1, 2 and 3).

Table 1. Distribution of different lip prints according to the (lipstick method)

Patterns	Males n=(15)	Females n=(15)	Z-score	*P* –value
Type I	05	07	5.47	-0.0001
Type I'	00	02	4.9	-0.0001
Type II	02	02	0.58	>0.05
Type III	04	02	2.7	<0.007
Type IV	03	01	5.52	<0.0001
Type V	01	01	6.22	<0.0001

P<0.05 is significant

Table 2. Distribution of different lip prints according to the (graphite method)

Patterns	Males n=(15)	Females n=(15)	Z-score	*P* –value
Type I	06	08	4.67	-0.001
Type I'	00	03	2.3	-0.0001
Type II	02	02	0.47	>0.05
Type III	04	01	3.2	<0.007
Type IV	03	01	2.54	<0.001
Type V	00	00	5.08	<0.001

Table 3. Distribution of lip prints by both methods according to gender

Patterns	Males lip print samples n=(30)	Females lip print samples n=(30)	Z-score	*P* –value
Type I	11	15	3.90	-0.001
Type I'	00	05	4.3	-0.001
Type II	04	04	1.68	>0.005
Type III	08	03	3.9	<0.007
Type IV	06	02	6.82	<0.001
Type V	01	01	5.92	<0.0001

P<0.05 is significant

4. DISCUSSION

Cheiloscopy is the study of lip prints and has presently become one of the upcoming tools for the identification of a person. Lip prints are considered to be unique to an individual and do not change during the life time of a person. Lip print identification is widely used in criminal and forensic practice [8,9].

Lip prints left at the crime scene should be dealt and handled carefully. At the crime scene lip prints can be obtained from windows, doors, cups, cigarette butts, clothes and other sites. Lip pattern can be used as a tool to identify the gender of victim & suspect in crime or other calamities. Lipstick smears can lead to indirect proof of a relationship or contact between a victim and a suspect or suspect and a crime scene [10].

While searching for lip prints, one must always consider that not all lipstick smears are colored. Recently the cosmetic industry has developed lipsticks which do not leave mark or a smear; these are known as persistent lipsticks [11]. In such situation, although invisible, these prints can be lifted using materials such as aluminum powder and magnetic powder. The identification of latent print evidence is often considered the key in solving a crime [12].

In the present study, no two lip prints matched with each other thus establishing uniqueness of lip prints which was in accordance with earlier studies done by Endris et al. [13] and Hashim et al. [14].

It was found that Type I pattern [clear cut vertical grooves that run across the entire lip] was seen predominantly in females which was established by both methods. Type I' pattern [the grooves are straight but disappear half way instead of covering the entire length] was seen only in females by both methods.

Type II [the grooves fork in their course] was seen equally in males and females which is an agreement with earlier studies done by Seguy et al. [11] and Acharya et al. [15]

Type III [the grooves intersect] and IV pattern [the grooves reticulate] was prominently seen in males which is in agreement with studies done by Gondivkar et al. [10] Type V [the grooves do not fall into any of the types I-IV and cannot be differentiated morphologically] did not show any significant difference in male and female lip patterns.

5. LIMITATIONS

Various factors can alter lip prints recording. Lip prints have to be obtained within 24 hours from the time of death to prevent erroneous data that would result from postmortem alterations of lips. Lip print patterns depend on whether the mouth is opened or closed. In closed-mouth position lips exhibit well-defined grooves, whereas in open position the grooves are relatively ill defined and difficult to interpret [16]. Any pathology of the lips such as mucocele or any postsurgical alteration of the lips can change the lip print patterns. Also, loss of support due to loss of anterior teeth can cause changes in lip prints. Any debris or fluid on the lip surface, application of a thick layer of lipstick, or over stretching of cellophane tape can alter lip prints recording [17,18].

6. CONCLUSION

The present study is able to convey that lip prints behold the potential of determination of gender. Both methods which were used to record lip prints showed almost similar results thus confirming the fact that both methods are reliable and can be used to record lip prints for future study on lip prints. Hope the results of this study will help to motivate some curious minds to think over the wonderful science of cheiloscopy. However further longitudinal studies with larger sample sizes are recommended to substantiate the results.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Domaity MA, Ali-gaidi SA, Elayat AA, Safwat MD, Galal SA. Morphological patterns of lip prints in Saudi Arabia at Almadinah Almona warah Province. Forensic Sci Int. 2010;200:79-84.
2. Verghese AJ, Somasekar M, Babu U. A study on lip print types among the people of kerala. J Indian Acad Forensic Med. 2010;32:6-7.
3. Snyder LM. Homicide Investigation textbook; Springfield: Thomas. 1950;65: 88-156.

4. Segui MA, Feucht MM, Ponce AC, Pascual FAV. Persistent lipsticks and their lip prints: new hidden evidence at the crime scene. Forensic Sci Int. 2000;112:41-7.
5. Caldas IM, Magalhaes T, Afonso A. Establishing identity using cheiloscopy and palatoscopy. Forensic Sci Int. 2007;165:1-9
6. Manas B, Namita M, Pradeep Y. Efficacy of lip prints for determination of sex and inter observer variability. Eur J Exp Biol. 2011;1:81-6.
7. Suzuki K, Tsuchihashi Y. New attempt of personal identification by means of lip print. J Indian Dent Assoc. 1970;1:8-10.
8. Sharma P, Saxena S, Rathore V. Cheiloscopy; the study of lip prints in sex identification. J Forensic Dent Sci. 2009;1:24-7.
9. Reddy LV. Lip prints: An overview in forensic dentistry. J Adv Dent Res. 2011;11:16-20.
10. Gondivkar MS, Indurkar A, Degwekar S, Bhowate R. Cheiloscopy for sex determination. J Forensic Dent Sci. 2009;1:56-9.
11. Segui MA, Feucht MM, Ponce AC, Pascual F. Persistent lipsticks and their lip prints: New hidden evidence at the crime scene. Forensic Sci Int. 2000;112:41-7.
12. Patel S, Paul I, Ramesh G, Sowmya GV. A study of lip prints in relation to gender, family and blood group. Int J Oral Maxillofacial Pathol. 2010;1:4-7.
13. Endris R, Poetsch-Schneider L. Value of human lip lines and nail striations in identification. Arch Kriminol. 1985;175:13-20.
14. Hashim HA, Sarhan OA, Bukhary MT, Feteih R. Vertical and horizontal linear growth of the maxillary and mandibular lips: a longitudinal study. J Clin Pediatr Dent. 1997;21:125-9.
15. Acharya AB, Taylor JA. Are a minimum number of concordant matches needed to establish identity in forensic odontology. J Forensic Odontostomatol. 2003;21:6-13.
16. Vahanwala SP, Parekh BK. Study of lip prints as an aid to forensic Methodology. J Forensic Med Toxicol. 2000;17:12-8.
17. Utsuno H, Kanoh T, Tadokoro O, Inoue K. Preliminary study of post mortem identification using lip prints. Forensic Sci Int. 2005;149:129-32.
18. Kavitha B, Einstein A, Sivapathasundharam B. Limitations in forensic odontology. J of Forensic Dent Sci. 2009;1:8-10.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/10403