Comparative Study of Lip Prints Using Conventional and Sudan Black Method

[1]Dr. Varsha Ajit Sangle, MDS, Associate Professor, Department of Oral Pathology & Microbiology, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

[2]Dr. Smita Chaware, Senior Lecturer, Department of Oral Pathology & Microbiology, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

[3]Dr.Gauri Ugale, Professor, Department of Periodontology, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

[4]Dr. Ashwini Biradar, Reader, Department of Public Health Dentistry, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

[5]Dr. Tejashri Mantri, Reader, Department of Oral Medicine and Radiology, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

[6]Dr. Shilpa Kendre, Reader, Department of Orthodontics, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

Corresponding Author: Dr. Varsha Ajit Sangle, MDS, Associate Professor, Department of Oral Pathology & Microbiology, MIDSR Dental College, Ambajogai Road, Latur. Maharashtra, India.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Identification using lip prints was first performed in the 1950s and was the subject of much research in the 1960s and 70s, leading to the acceptance of this technique as evidence in the criminal justice system. Previous research has focused on identifying lip print types or on methods of obtaining hidden lip prints left at the crime scene. The Present study focused on the Sudan black method of analyzing the Lip Print images, using Adobe Photoshop CS2 software serves as the most convenient method that provides better visualization and ease in identification and recording of the Lip Print pattern. It also serves as an ideal method of permanently storing the data which will help in keeping an ante- mortem record of an individual as well as the search for invisible or latent prints at a crime scene.

Keywords: Lip prints, Forensic Science, Personal identification, Sudan Black Powder.

Page 156

Introduction

The wrinkles and grooves are present in the zone of transition of human lips, between the inner labial mucosa and outer skin. The imprint produced by these grooves is termed lip print. Study of lip print is referred to as cheiloscopy (from greek word: chelios - lips, scopy – study). Lip prints are unique and do not change during the life of an individuals. Lip prints can be instrumental in identifying a person positively and can be used to verify the presence of a person at the scene of crime.[1] Lipsticks are complex substances, which contain oils such as modified castor oil, waxes, organic inks and inorganic pigments for colour. Lipsticks produce visible lip prints that can be easily studied.[2] so in routine technique lipstick and cellophane tape will be used to acquire the lip prints from the subjects which will be then examined by a magnifying lens. In Sudan black technique, glass slides will be used to obtain lip prints from non-lipstick coated lips of the subjects. Development of these lip prints will be made by Sudan black powder and will be examined by computer assisted observation. The purpose of this study is to evaluate the possibility of using cheiloscopy for sex determination by using two different methods and also to compare the efficacy of these two methods.

Materials and Methods

Materials used for conventional technique: Lipstick, Bond paper**,** Cellophane tape**,** brush (disposable) for applying lipstick, Scissors, Magnifying lens

Materials used for Sudan black technique: Sterilized glass slides**,** Vaseline**,** Permanent marker, Sudan black powder (2, 3-dihydro-2, 2dimethyl-6-[(4-phenylazo-1-naphthalenyl)- azo]-1H-perimidine.)**,** Camel hair brush

Equipment used: Nikon Camera and adobe Photoshop CS2 software

Source and Method of Collection of Data: The present study was carried out in the department of Oral Pathology & Microbiology, MIDSR Dental College and Hospital, Latur. The study groups consisted of 200 lip prints from the visiting patients and students of MIDSR dental college. 100 lip prints taken for conventional method as well as 100 (of the same people) for Sudan black technique in which 50 were males and 50 females.

Method of collection of the data for conventional method: The lips of the individuals were cleaned and the dark colored lipstick was applied on the lips. Glued portion of cellophane tape was placed over the lips with lipstick and subjects were asked to make a lip impression in the normal rest position of lips by dabbing lips in centre first and then pressing them uniformly towards the corners of the lips. The cellophane tape is then attached to a white chart paper for permanent record purpose.[3]

Method of collection of the data for Sudan black method: Initially, lip prints were taken from each individual on a clear glass side measuring about 1''x3''. Lip prints were taken with the lips kept dry, so that sebaceous secretions stick on the glass slides when pressure was applied, sometimes a thin layer of Vaseline was used to get better prints. Right to left rotational movement of the slide was used to provide better prints with uniform pressure was used to obtain an impression of the lips from corner to corner as much detail as possible. These lip prints were then dusted with a black colored carbon powder using a delicate brush.

Care was taken to avoid smudging of the prints while sprinkling the carbon powder. With the use of a permanent marker, lip prints were labeled by names (known) at either ends of the glass slide. All glass slides with lip prints were stored in a slide box to avoid dust particles.

In the present study Suzuki. K and Tsuchihashi Y classification were used for the analysis of recorded lip prints.

In a study conducted by Vahanwala-Parekh, it was suggested that certain pattern trends were prevalent in either sex. In this present study suggested pattern trends were used for sex determination.[4] [Table 1]

Examination of the prints for Conventional Technique: Lip prints obtained were coded, keeping in account the name and sex of the respective individuals. At the time of analysis the sex of the print was not disclosed. The lip print was divided into 4 quadrants as following four areas: upper right (UR), upper left (UL), lower right (LR), lower left (LL). During the analysis of the prints, the most lateral part of the lip print (near the angles of the mouth) was excluded as it was usually wrinkled. In the male lip prints, it was occasionally difficult to determine the philtrum (usually masked by the moustache), so the middle area of each lip (about 15 mm) was considered as upper middle and lower middle areas. The obtained prints were examined by magnifying hand lenses (with direct light focused on it) and the groove types were analyzed according to Vahanwala–Parek [4], Suzuki. K and Tsuchihashi Y [5] classification.

Examination of the prints for Sudan black Technique: Lip prints of each individual were photographed by a digital camera (Nikon 300 D 12.5 MP) [Fig 9]. The images were cropped to the actual size of the glass slides

The obtained prints were examined by magnifying hand lenses (with direct light focused on it) and the groove types were analyzed using software called' ''Adobe Photoshop CS2''. And the same analysis was carried out as with the magnifying glass.

Comparison of the efficacy between Conventional and Sudan black technique: The efficacy between these two techniques were compared using parameters of Good (++), Fair (+), and poor (-).

Good (++): Lip outline and lip grooves that can easily be studied.

Fair (++): Lip outline that can be noticed but with less clarity of lip grooves.

Poor (-): Lip outline can still be noticed but lip grooves cannot be appreciated.

Results and Discussions

Results of the above analysis showed that the most common patterns seen in study population was the vertical type (36%). This was followed by the intersecting pattern, which was 16%. The frequency of other 4 types branched, incomplete vertical, reticular and undetermined was 15.5%, 12.25%, 7% and 5.75% respectively. [Graph 1]

In the distribution of various lip prints patterns in males and females, the intersecting pattern was predominant in males 26.8% and vertical pattern, both complete and incomplete, was predominant in females 82%.

Quadrant –wise sub classification in males has shown that intersecting pattern is predominant in quadrant II and quadrant III and branched pattern in quadrant I and quadrant IV.

Quadrant –wise sub classification in females has shown that vertical pattern is predominant in all quadrants.

Frequency of repetition of lip prints patterns

All quadrants with similar lip patterns were observed in 8.6% females and in 4.8% males. In three quadrants with similar lip pattern 5.6% was observed in males and 0.5% in female. In two quadrants with similar lip pattern 12.3% were observed in males and 11.8% in females. All quadrants with different patterns were observed in 5.6% males and in 1% females. [Graph 2]

In evaluation of lip patterns in sex determination we found that 34 of actual 50 lip prints of males were correctly identified. The sensitivity of this classification over original gender i.e., the percentage of correct measurement is 68 %. Out of 50 female we got the correct results for 36 females. The sensitivity of this classification over original gender i.e., the percentage of correct measurement is 72 %.

In comparison of the efficacy between Sudan black and Conventional method shows that 70 good samples were seen with Sudan black technique whereas only 46 good samples were seen with Conventional technique. 12 poor samples were seen with Sudan black whereas 21 poor samples were seen with Conventional method. P-value less than 0.05 is considered to be statistically significant. [Graph 3]

Discussions

A traditional or conventional lipstick produces a print that is initially identifiable and can be seen with the naked eye. These are called as visible prints. However, the cosmetic industry has developed long-lasting lip prints called Invisible prints or latent prints. The edges of the lips have sebaceous glands with sweat glands in between, thus, secretions of oil and moisture from these enable development of latent lip-prints analogous to latent finger prints. Collection of the Lip Prints with a suitable transferring and recording media is important. Various methods have been followed till today for recording the lip prints. In the present study both latent and visible lip prints were studied and compared by using Conventional and Sudan black technique. [3,5,6]

In the Conventional technique we used lipstick and cellophane tape to take the lip prints and then examined them by a magnifying lens. In Sudan black technique glass slides were used to obtain the lip prints. Development of these lip prints were made by Sudan black powder and examined by computer assisted observation. The efficacy between these two techniques were studied and compared.

By using Chi-square test, statistical analysis was done and a p-value < 0.05 was obtained. Hence it seems to prove that after statistical analysis Sudan black technique was far more superior and accurate for the identification than the Conventional technique.

Thus, the results showed that Sudan black method of analyzing the Lip Print images using Adobe Photoshop CS2 software serves as a convenient method that provides better visualization and ease in identification and recording of the Lip Print pattern. Latent print can also be used as a DNA source because epithelial cells could be retrieved from the print so as to double its identifying value.[7] The disadvantage of Conventional technique is that the lip prints can get distorted or smudged. [8] This can be easily overcome by Sudan black technique.

In the present study it was found that Sudan black powder is very useful for developing this latent lip print and provides a better quality of lip prints which can be useful at the crime scene. [8,9] No two lip prints matched with each other, thus establishing the uniqueness of the lip prints and the significance of its identification in forensic evaluation. [10,11]

Limitation of cheiloscopy which needs to be considered is the existence of some pathological conditions (lymphangiomas, congenital lip fistula, Merkel son-Rosenthal syndrome, syphilis, among others) which can invalidate the cheiloscopy study.[12] Inspite of this limitation this study may help to add certain new aspects to the use of the lip prints in forensic practice since lip prints behold the potential for sex identification.[13] The study of lip prints needs to be developed further to prove its use as an effective tool for identification just like

fingerprints. [14] Though the results obtained by this study does not prove to be a full-proof one it does seem to promise to go one step closer to the "Truth" …. locating justice. [8,15] Lip prints thus hold potential promise as a supplementary tool along with other modes to recognize the sex of an individual. [16,17]

Conclusion

The existing classification does not take into account the various other types of patterns occurring on the lips. This study also noticed few new patterns which need further classification and can be added as a separate lip patterns. It showed horizontal lines, multiple branching appearance and whorl pattern. Perhaps a more comprehensive classification of the lip print patterns is the need of the hour. It will be better if a method is standardized to analyze the lip prints with the help of some software programs in the wake of recent technological advancements in forensic investigations. Exploration of literature reveals that very few have ventured this area and that there are many untreaded paths which have to be covered. Hope this study invites at least a few curious minds to think over the wonderful science of cheiloscopy. However further longitudinal studies with even larger sample sizes are around thousand recommended to substantiate the results.

References

1. Gondvikar S.M, Indurkar A, Degwekar S, Bhowate R. Cheiloscopy for sex determination. J Forensic Dent Sci .2009; 1(2):56-60.

2. Singh. N, Brave V.R, khanna. S. Natural dyes versus lysochrome dyes in cheiloscopy: A comparative evaluation. Journal of forensic science.2010; 2(1):11-17.

3. Sharma P, Saxena S and Rathod V. Cheiloscopy. The study of lip prints in sex identification. J Forensic Dent Sci.2009; 1:24-7.

4. Vahanwala S.P, Parekh B.K. Study of lip prints as an aid to forensic Methodology. JFMT. 2000; 17(1):12-18.

5. Suzuki K, Tsuchihashi Y. New attempt of personal identification by means of lip print. J Indian Dent Assoc 1970; 42:8-9.

6. Sivapathasundharam B, Prakash P. A, Sivakumar G. Lip prints (Cheiloscopy). Indian J Dent Res. 2001; 12(4):234-37.

7. Ball J. The current status of lip prints and their use for identification. J Forensic Odontostomatol. 2002; 20: 43-6.

8. Castello A, Mercedes Alvarez and Fernando Verdu. Just lip prints? No: there could be something else The FASEB Journal. 2004; 18:615-616.

9. Vahanwala. S, Nayak. C.D, Pagare. S.S. Study of lip prints as aid for sex determination. Medico legal update 2005;5(3): 93–98.

10. J. Augustine, Barpande S.R. and Tupkari J.V. Cheiloscopy as an adjunct to forensic identification: A study of 600 individuals. J Forensic Odontostomatol 2008; 27(2):44-52.

11. Saraswathi TR, Gauri M, Ranganathan K. Study of lip prints. J Forensic Dent Sci. 2009;1: 28-31.

12. Sharma P, Saxena S, Rathod V. Comparative reliability of cheiloscopy and palatoscopy in human identification. Indian Journal of Dental research 2009; 20(4):453-457.

13. Wael M. Saad, Assem H. Kamel, Hassan F.Z., and El- Otiefy. Genetic Studies on the Inheritance of Lip Prints in-Cleft Lip and Palate. Egypt. J. Plast. Reconstr. Surg.2005; 29: 9-12.

14. Patel S, Paul I, A.S Madhusudan, Gayathri Ramesh, G.V. Sowmya. A study of lip prints in relation to gender, family and blood group. International Journal of Oral & Maxillofacial Pathology. 2010; 1(1):4-7

15. El Domiaty M.A, Sami Awda Al-gaidi, Ahmed Abdelmoneim Elayat, Maha Diaa Eldein Safwat, Sherief Ahmed Galal. Morphological patterns of lip prints in Saudi Arabia at Almadinah Almonawarah province. Forensic Science International 200 (2010) 179.e1–179.e9

16. Verghese J, M. Somasekar, R. Umesh. A Study on Lip Print Types among the People of Kerala. J Indian Acad Forensic Med 2010; 32(1):6-8.

17. Jaishankar S, Jaishankar N, Shanmugam S. Lip Prints in Personal Identification JIADS.2010 ;1 (4) :23-26.

18. Prasad P, Vani shree. A comparison of lip prints between Aryans-Dravidians and Mongols. Indian Journal of Dental research 2011; 22(5):664-667.

Figure Legends

Conventional Method

Fig 1: Type I (Complete Vertical Pattern)
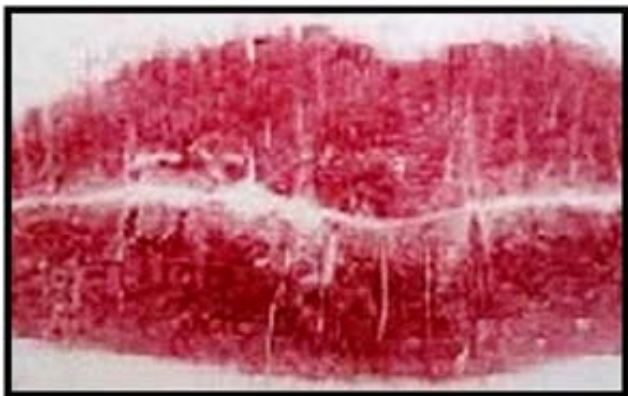
Fig 2: Type I' (Incomplete Vertical Pattern)

Fig 3: Type II (Branched Pattern)

Fig 4: Type III (Intersecting Pattern)
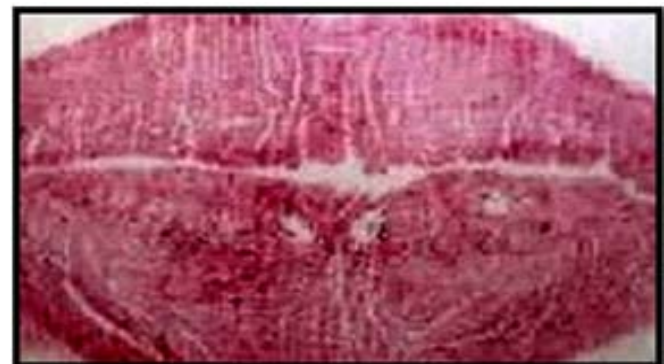

Fig 5: Type IV (Reticular Pattern)

Fig 6: Type V (Undetermined Pattern)

Sudan black Method

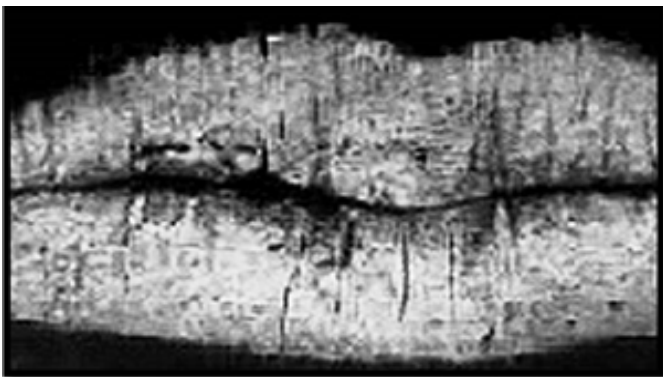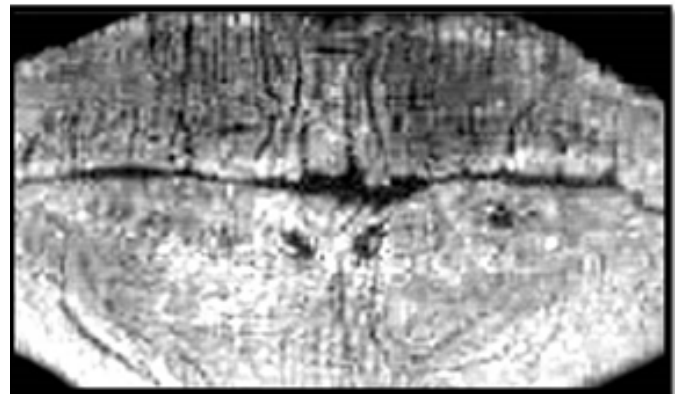Fig 1a: Type I (Complete Vertical Pattern)

Fig 2a: Type I' (Incomplete Vertical Pattern)

Fig 3a: Type II (Branched Pattern)

Fig 4a: Type III (Intersecting Pattern)


Fig 5a: Type IV (Reticular Pattern)


Fig 6a: Type V (Undetermined Pattern)

Table 1: Vahanwala-Parekh Classification.

Lip-pattern	Region of occurrence	Predominantly seen in
a. Type I & Type I	1st quadrant [right upper lip]	Female
c. Type II	2nd quadrant [left upper lip]	Male
d. Type III	Never occurs in lower lip.	If so then only in male
e. Varied patterns	in all quadrants	Male
f. Same [a like] patterns	in all quadrants	Female

Graph 1: Classification of lip patterns in the study group.
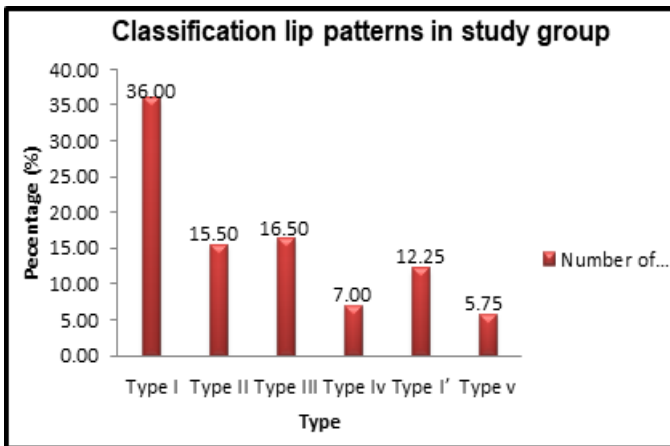
Graph2: Frequency of repetition of lip patterns in both sexes.
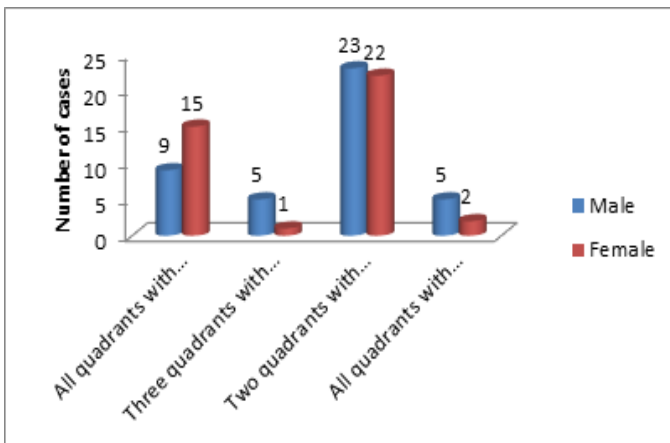
Graph 3: Comparisons the efficacy between Sudan black and Conventional method.