Significance of Cheiloscopy and Dermatoglyphics in Sex Determination

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Abstract

Background: Personal identification has an important role in forensic sciences. Lip print and thumb print can be used for personal identification since they are unique for individuals and do not change during the life of a person.

Objective: To analyse predominant patterns of lip print in females and males, To analyse predominant patterns of finger print in females and males, To identify if there exists any correlation between lip prints and finger prints.

Material and Method: A cross sectional study was conducted in Sathyabama Dental College among 500 individuals (250 females and 250 males) between age group of 18-40 years. Fingerprint and lip print of all the subjects were collected and compared, and the results were analyzed based on Micheal Kucken classification system for fingerprints and Suzuki and Tsuchihashi classification for lip prints. Descriptive and inferential statistics were carried out. Level of significance was set as 0.05.

Result: Reticular lip print pattern was found in majority (36.4%) of the males, whereas vertical grooves (29.6%) and branched grooves (29.6%) are common in females. Finger prints showed that loop pattern is more common in both males and females. This study showed a significant correlation between lip prints and thumb pattern in males while females showed no significance.

Keywords : *Lip Print; Finger print; Sex determination; Cheiloscopy; Dermatoglyphics.*

Introduction

Every human being is distinct and discernible in that they exhibit their own pattern of characteristics[1]. Personal identification is one of the key areas in the forensic sciences. The common techniques which are employed to ensure fast and secure identifications were DNA comparisons and finger print analyses, but there are certain crime scenarios where other supplemental aids like lip prints, palatal rugae pattern, bite marks, etc, are used[2]. However, personal identification by physical appearance and visual examination may play a role in adjunct mode rather than confirmatory. One such physical evidence for personal identification in forensic scene is lip print analysis and finger print analysis[3].

Lip print and thumb print can be used for personal identification since they are unique for individuals and do not change during the life of a person. It has been verified that lip prints recover after undergoing alterations such as minor trauma, inflammation and herpes and that the disposition and form of furrows does not vary with environmental factors[4].

Lip prints are a characteristic pattern formed by the wrinkles and grooves on labial mucosa and is unique to one person except in monozygotic twins. The study of lip print is known as “Cheiloscopy”. Unique set of minute raised ridges seen on the volar pads are called the fingerprints, the study of which is called “Dermatoglyphics”.

Due to the immense potential of fingerprints and lip prints as an effective method of identification an attempt has been made in the present work to investigate whether the lip prints are unique to any fingerprint in the population under investigation based on gender and to see if this association will help forensic odontologists in

the personal identification of the person at the scene of crime and in solving crimes[5].

Methodology

A cross sectional study was conducted after obtaining ethical clearance from the Institutional Ethical Committee Sathyabama Dental College [Ref No: Sathyabama university/ IHEC/study no 011] among 500 individuals (250 females and 250 males), who had morphologically healthy look, devoid of congenital or developmental abnormalities. The study procedure was explained to the participants and a written consent was obtained from each individual before the start of the study. Analysis of lip prints and finger prints was done as follows

Lip print analysis:

The lips of the individuals were cleaned. A thin coat of dark coloured lipstick was applied uniformly on the lips by a lipstick applicator brush starting at middle and moving laterally. The sticky side of the cellophane tape was placed over the lip in resting position and pressed uniformly. Tape was then gently removed from the lip without distorting the lip print and then stuck to the chart sheet. The Lip prints were interpreted using magnifying glass. While studying the various types of Lip prints, the lips were divided into 6 compartments. Lip prints was studied on all the compartments and the type of pattern which was prominent was observed based on Suzuki and Tsuchihashi classification[3]. According to this classification, the lip print pattern is divided as; Type I: Clear cut vertical grooves that run across the entire lip; Type I': Similar to type-I but do not cover the entire lip; Type II: Branched grooves; Type III: Intersecting grooves; Type IV: Reticular grooves; Type V: Grooves that do not fall in any of the pattern.

Finger print analysis:

For recording finger print, the imprint of the left thumb was recorded using an ink pad on chart sheet, after cleaning and drying the hand. The primary patterns of the finger prints was observed using a magnifying glass and interpretated using Michael Kucken classification[6] as Loop pattern, Arch pattern and Whorl Pattern.

Statistical analysis:

The data collected was compiled in Microsoft excel sheet and transferred to version 20 SPSS software. Descriptive and inferential statistics were carried out. Level of significance was set as 0.05.

Results

Table 1 and 2 shows there is a statistically significant difference among male and female considering lip prints and finger prints. Majority of the male population shows Reticular pattern whereas vertical grooves and branched grooves are common in females. Finger prints showed that loop pattern is more common in both males and females. Table 3 shows there is a significant correlation among males in lip pattern and finger print with r value of -0.133 and there is no correlation among females in lip print and finger print with r value of 0.081.

Table 01: Comparison of lip prints between male and female population

Lip patterns	Male		Female			
	Frequency	Percent	Frequency	Percent	Chi square value	p value
Clear cut vertical grooves that run across the entire lip.	39	15.6	74	29.6	37.65	0.05*
Similar to type-I but do not cover the entire lip.	24	9.6	33	13.2		
Branched grooves.	49	19.6	74	29.6		
Intersecting grooves.	46	18.4	55	22		
Reticular grooves.	91	36.4	13	5.2		
Grooves that do not fall in any of the pattern.	1	0.4	1	0.4		
Total	250	100	250	100		

Table 02: Comparison of Finger prints between male and female population

Fingerprints	Male		Female			
	Frequency	Percent	Frequency	Percent	chi square value	p value
Loop Pattern	144	57.6	138	55.2	9.82	0.044*
Arch Pattern	27	10.8	42	16.8		
whorl Pattern	79	31.6	70	28		
Total	250	100	250	100		

Table 03: Correlation between of lip and Finger patterns among male and female.

	Spearman's Correlation Coefficient	Sig. (2-tailed)	N
Male lippatterns	-.133	0.035	250
Male fingerpatterns			
Female lippatterns	0.081	0.2	250
Female fingerpatterns			

Table 04: Age distribution among male and female.

Descriptive Statistics		Age				
		Minimum	Maximum	Mean	Std. Deviation	N
Sex	Male	18	47	25.01	6.866	250
	Female	17	43	23.83	6.245	250

Discussion

Lip prints and thumb print are unique for any individual and hence its being used significantly in the field of forensic sciences for individual identification. The Klein's zone, in the lips is the area which is usually concerned for identification and is covered with wrinkles and grooves that forms a unique characteristic pattern[7]. The primary dermal ridge in the fingerprint formed during 12-13 weeks of intrauterine life is fixed throughout the life of an individual. The size and shape may vary with age but the basic pattern remains permanent.[8] This study was undertaken to identify whether certain lip prints are unique to any fingerprint in the population under investigation.

The present study reports predominant lip pattern in males is reticular grooves and in females, branched and vertical grooves running across entire lip is equally predominant. This study is in accordance with studies done by Vahanwala et al[9] and Krishnan RP et al.[10] In contrast, Nagasupriya et al[11], Negi A et al[12] reports branch pattern predominant in males. Loop pattern is common in both males and females followed by Whorl pattern in this study. This finding is similar to other Indian studies conducted by Srilekha N et al (2014)[13], Nagasupriya A et al (2011)[14] and Mutalik VS et al (2013)[15].

This study shows a significant correlation between lip prints and thumb pattern in males while females shows no significance. This is similar with the findings of Naik R et al (2017)[15] and Nagasuriya et al(2011)[14] who found significance of finger pattern and lip prints in males and not in females. However, it is observed that the associated finger pattern and lip print in both studies

are different. Naik R et al (2017) suggests Intersecting grooves in lip prints and whorl type of thumbprint in males are significant, whereas, Nagasupriya et al(2011)[14] suggests branching type of lip print and arch pattern in finger prints are significant.

From this study, it can be concluded that the reticular grooves is commonly seen lip print in males. Branched and vertical grooves running across entire lip is equally predominant lip print in females. Loop pattern is finger pattern is common in both males and females. There is a significant correlation seen between lip print and finger pattern in males.

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References

1. Rajendran R, Sivapathasundharam B. Shafer's Textbook of Oral Pathology. 7th ed. New Delhi: Elsevier; 2012. pp. 879–922.
2. Sivapathasundharam B, Prakash PA, Sivakumar G. Lip prints (cheiloscopy) Indian J Dent Res. 2001;12:234–7.
3. Suzuki K, Tsuchihashi Y. New attempt of personal identification by means of lip print. J Indian Dent Assoc. 1970;42:8–9.
4. Suzuki K, Suzuki H, Tsuchihashi Y. On the female lips and rouge. Jpn J Leg Med. 1967;67:471.
5. Cottone JA, Standish SM. Outline of Forensic Dentistry. Chicago and London: Year Book Publishers; 1982. pp. 73–111.
6. Nandan SR, Bandaru BK, Santosh AB, Thankappan P, Chundru NS, Amudala R. A study on association and correlation of lip and finger print pattern analysis for gender identification. Journal of Dr. NTR University of Health Sciences. 2015 Jul 1;4(3):176.
7. Amith HV, Ankola AV, Nagesh L. Lip prints – Can it aid in individual identification. J Oral Health Community Dent. 2011;5:113–8.
8. Mulvihill JJ, Smith DW. The genesis of dermatoglyphics. J Pediatr. 1969;75:579–89.
9. Vahanwala S, Nayak CD, Pagare SS. Study of lip prints as aid for sex determination. Medico-Legal Update. 2005;5:93–98.
10. Krishnan RP, Thangavelu R, Rathnavelu V, Narasimhan M. Gender determination: Role of lip prints, finger prints and mandibular canine index. Exp Ther Med. 2016;11(6):2329-2332.
11. Nagasupriya A, Dhanapal R, Reena K, Saraswathi T, Rarmachandran C. Patterns -"A crime solver" J Forensic Dent Sci. 2011;3:3–7.
12. Negi A, Negi A. The connecting link! Lip prints and fingerprints. J Forensic Dent Sci. 2016;8(3):177.
13. Srilekha N, Anuradha A, Vijay GS, Sabitha R. Lip print pattern, finger print pattern and abo blood group. J Clin Diagn Res 2014;8:49-51.
14. Nagasupriya A, Dhanapal R, Reena K, Saraswathi T, Ramachandran C. Patterns – "A crime solver". J Forensic Dent Sci 2011;3:3-7.
15. Mutalik VS, Menon A, Jayalakshmi N, Kamath A, Raghu AR. Utility of cheiloscopy, rugoscopy, and dactyloscopy for human identification in a defined cohort. J Forensic Dent Sci 2013;5:2-6.
16. Naik R, Ahmed Mujib BR, Telagi N, Hallur J. Comparative analysis of lip with thumbprints: An identification tool in personal authentication. J Oral Maxillofac Pathol 2017;21:171-5.