PUB: 107/2011

A study on personal identification by lip print patterns in South Indian population

Umesh Babu R*, Gurudatta S Pawar, Annie Verghese*****

*Assistant Professor, Department of Forensic Medicine, Sri Devaraja Urs Medical College, Tamaka, Kolar 563101, Karnataka.
**Professor and HOD, Department of Forensic Medicine, SS Institute of Medical Science, Davanagere 577005, Karnataka.
***Assistant professor, Department of Forensic Medicine, MVJ Medical College, Hoskote, Bangalore, Karnataka

Abstract

Identification of an individual is important in any medico legal matter or investigation. In the present study, the lip prints of 300 subjects [173 males and 127 females] belonging to south Indian population were studied by obtaining a thin smear of the prints and visualizing by the finger print powder (black). Individualistic nature and permanence of the lip prints was observed in the present study. Predominance of various types of lip print patterns in the four quadrants among the subjects are presented and evaluated. The results obtained by matching the prints obtained at follow up studies by using COREL-DRAW software has been excellent, which can be used to match the test prints with prints obtained at the scene of crime. The methodology used for recording and studying the prints is easy, economical and convenient. No specialized equipment or training is required to use this method. It was concluded in this study that no two individuals had same type of print patterns, even by considering the middle 5mm of each quadrant of the prints as evident from the study.

Introduction

Anthropometry, finger prints, and of late DNA finger printing have been used successfully in fixing the identity of a person in many cases as these are unique to every individual[1,2,3,4]. Like these methods lip prints can be instrumental in identifying a person positively and can be used to verify the presence or absence of a person at the scene of crime[4,5,6]. The wrinkles and grooves on labial mucosa, called sulci labiorum forms a characteristic pattern called as "LIP PRINTS" and the study of which is referred to as CHEILOSCOPY[2,4,7]. Studies have shown that even lip print patterns are individual features which remain unchanged throughout one's life[8,9,10]. Lip prints have a potential evidentiary value, which plays a prominent role in linking the criminal with the crime and also establishing identity of an individual[1]. The practical use of lip prints in detection work shows that the trace of this kind carries a huge amount of precious information which can be used in the reconstruction of the event and identifying suspects[9].Hence, the study of lip prints need to be developed so as to prove it as one of the easy, economical and useful tool for investigation, just like finger prints[4,11,12].

Material and methods

The materials required are

Skin care cream, a strip of paper 120mm long 45mm wide, transparent foil of adherent tape, magnifying lens, measuring scale, brush (Fingerprint brush /squirrel hair brush), View box, fingerprint dusting powder.

The study sample consisted of total 300 subjects [173 males and 127 females] in the age group of 18 – 22 yrs belonging to south Indian population. Subjects with cleft lip, any local disease or with fissures in their lips were excluded. The aim and objectives of the intended study were properly explained to the subjects in their vernacular language and informed written consent was taken in a proper proforma. Institutional ethical committee approval was obtained for this study.

Recording of prints

The lips [washed and dried] of each individual were smeared with skin care cream evenly. After about 3 minutes, prints are taken on an ordinary paper with central portion of lips dabbed first and then pressing it uniformly to the left and right corners of lips. The lip print pattern so obtained was visualized by using finger print dusting powder and fixed with a transparent foil. The print pattern so acquired is studied carefully with a magnifying lens. The print patterns were divided into four quadrants and were analyzed quadrant wise. After six-months repeat lip prints were taken to look for any seasonal variation or change in pattern of the prints. Ridge count was done by recording the individual groove patterns from medial to lateral aspect in each quadrant

For classification, the lip print is divided into four quadrants by selecting a mid point and the pattern in each quadrant is labelled with a marker. Labelling of a particular pattern is based on the numerical predominance of types of grooves present.

1. I – Vertical complete – if the grooves are straight and extend through out the breadth of the lip.
2. I^1 - Vertical incomplete - If the grooves are straight but do not cover the entire breadth of the lip.
3. II - Bifurcated – towards occlusal margin
4. II^1 - Bifurcated – towards outer margin
5. III - Intersecting
6. IV - Reticular or
7. V - If the grooves do not fall into any of the type I to IV and cannot be differentiated morphologically.

This is based on Yasuo Tsuchihashi's classification[8] except for type II^1, which is an addition in this study.

Follow up at 6 months interval

Samples of the lip prints of the same subjects were taken after an interval of 6 months. The prints obtained at follow up was compared with the respective previous prints to check for any change in the pattern of the lip prints by using a software called COREL DRAW by superimposition photography.

Method of comparision of lip prints

Scanner used - UMAX2000, Sharpness 100%, Resolution 300 dpi

Software used – COREL DRAW.

The prints obtained initially (I set) is saved as "JPEG" images and the prints obtained subsequently at the interval of 6 months (II set) is saved as "GIF" transparency images with the help of scanner. The images so obtained are subjected for comparison.

Manual comparison

The prints from I set and II set of the same individual were taken in same frame and compared manually looking for at least 10 features using magnifying lens

Super imposition

The prints from I set and II set are magnified to same frame. GIF images are overlapped on the JPEG images. Both

Table I: Pattern predominance

	QuadrantsN=1114*	Malen=628	Femalen=486	Male %	Female %
Type I	First quadrant	37	21	17.8	16
	Second quadrant	34	20		
	Third quadrant	17	22		
	Fourth quadrant	24	15		
Type I^1	First quadrant	05	04	4.6	2.8
	Second quadrant	12	05		
	Third quadrant	06	04		
	Fourth quadrant	06	01		
Type II	First quadrant	11	08	7	6.4
	Second quadrant	18	07		
	Third quadrant	12	08		
	Fourth quadrant	03	08		
Type II^1	First quadrant	30	28	28.3	29.2
	Second quadrant	29	26		
	Third quadrant	64	42		
	Fourth quadrant	55	46		
Type III	First quadrant	29	13	21.3	16
	Second quadrant	34	22		
	Third quadrant	35	23		
	Fourth quadrant	36	20		
Type IV	First quadrant	37	43	14.8	22.8
	Second quadrant	22	32		
	Third quadrant	12	15		
	Fourth quadrant	22	21		
Type V	First quadrant	08	07	6	6.6
	Second quadrant	13	11		
	Third quadrant	09	07		
	Fourth quadrant	08	07		

the images are matched considering few selected primary grooves in the prints. Here initially few primary grooves are selected on both the prints. The prints are then superimposed considering primary grooves selected. All the grooves, contours of lips, margins and relative measurements are tallied.

Results and observation

*each subject's prints divided into 4 quadrants, hence n=300×4%86=1114 (86 is the number of quadrants with smudged prints).

Table 1 shows the descriptive statistics of lip print patterns in the four quadrants

In the present study it was noted that, [table. No.1] type I (190) is more common in the upper lip (112) especially in males where as Type II^1 (320)is seen more commonly in lower lip(207) especially in males. The combination of lip prints quadrant wise of each individual was unique.

Table II shows the statistics of predominance of various lip print patterns among the subjects

Type II^1 was most predominant which is seen in 28.7% of subjects whereas type I^1 was least common which is seen in just 3.8% of subjects.

Type I, III, and IV was seen on an average of 18.1% of subjects whereas types II and V on an average of 6.4% of subjects.

Table2 : Showing percentage distribution of types among subjects

Patterns	Percentage
Type I	17
Type I^1	03.8
Type II	06.7
Type II^1	28.7
Type III	19
Type IV	18.3
Type V	06.2

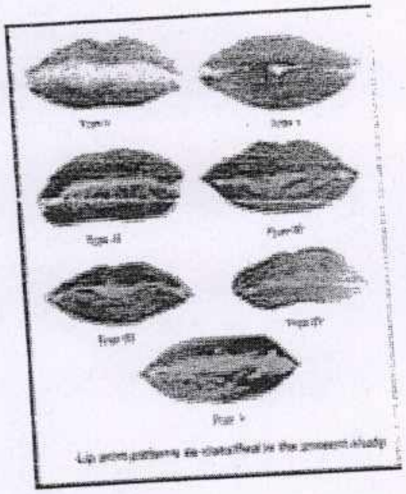
Discussion

The study of lip print patterns from 300 [173 males and 127 female] inhabitants of south India revealed that,

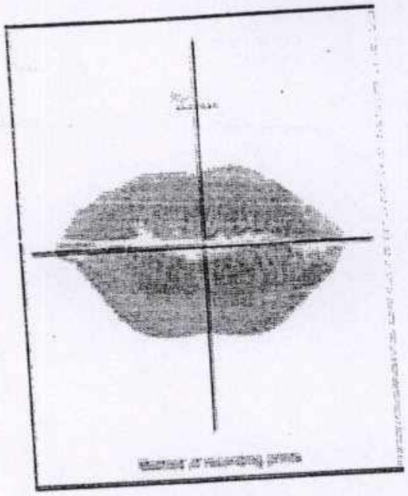
- No two lip prints matched with each other in the present study which is consistent with previous studies published in literature[1,2,3,4,10]. Thus establishing the uniqueness of the lip prints and thereby being a potential identification feature of an individual.
- Most common pattern of lip prints in both males and females was the Y-shaped, with the branching towards the outer margin of the lips (type II^1-28.7%). This is in contrast to the study done by Sivapathasundaram et.al. and study done by Yasuo Tsuchihashi et,al which shows that type III is commonest
- The least common variety being the undetermined types (type V-6.2%) which could not be classified into any other type of lip print patterns. This is consistent with study done by Sivapathasundaram et.al. and Yasuo Tsuchihashi et,al
- Furthermore to check the permanent nature of the print patterns, superimposition technique has been used with the help of COREL DRAW soft ware. This can also be used for comparison of the prints at the scene of crime with that of the suspect, since prints of any two people cannot be matched. It was confirmed that the labial wrinkles and grooves of each of the individual do not have seasonal variation and were identical with the one taken 6 months earlier.
- Previous studies have not considered the ridge count as an identification feature. This present study has attempted to trace the ridge count differences between individuals in a particular pre selected segment of the prints which can add up to the individualistic features of the lip prints.

Conclusion

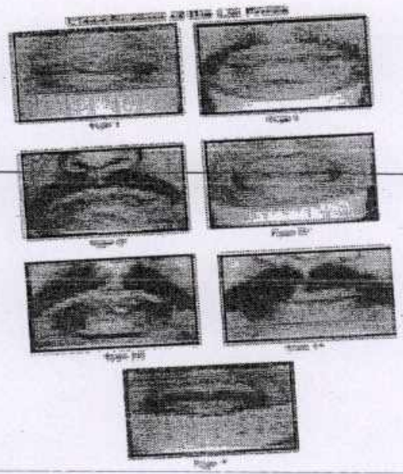
This study has been taken to broaden the horizon of lip



Lip print patterns as classified in the present study



Method of recording prints



Picture showing Corel Draw-10 Software for observation and comparison of Lip Prints

After superimposition

prints in the form of ridge count and highlight this particular methodology that can be used to establish the identity, considering particular segment of the prints like that of finger prints. This study shows that lip prints are unique to an individual and no two prints had same patterns in the selected segment. It was concluded that the labial wrinkles and grooves of the individual do not show any seasonal variation and were identical with the earlier print. The ridge count, recording of individual groove patterns and superimposition technique has confirmed the individual unchanging characteristic of the lip prints, and thereby being a potential identification tool. We recommend that further studies with wider samples of other regions of India should be conducted.

This study has confirmed that lip prints are unique to an individual like that of fingerprints and there are no appreciable changes seen in the lip prints due to change in seasons.

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FIRST AUTHOR

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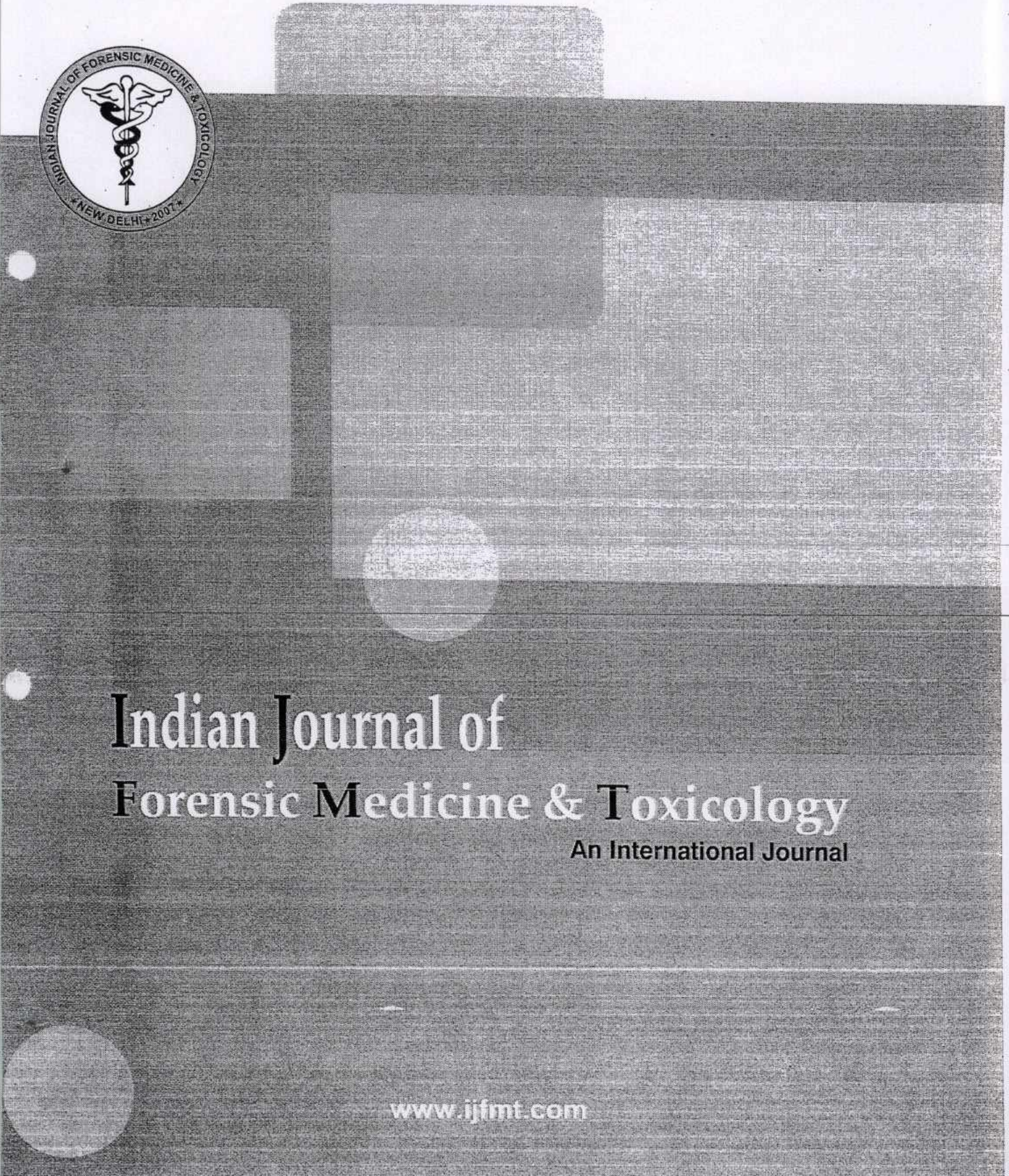
ISSN-0973-9122 (Print) • ISSN-0973-9130 (Electronic)

Volume 5 / Number 1 / January - June 2011



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