

## Lip print pattern on different medias: a forensic identification tool

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### Abstract

Lip prints are known to be helpful in identification at the crime scene. Its validity comes in question if the data of an individual country or race are not present. The quality may be affected by the media on which the lip prints are available.

With this aim study on different medias were done with a sample size of 75 volunteers on 4 different types of surfaces.

Lip prints are best visualized on the glass surface followed by cup surface and wood surface. Results on the clothes were at the bottom as far as identification was concerned.

**Keywords:** Lip Prints; identification; different medias.

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### Introduction

Role of lip prints in identification is very vast. Study of lip prints is known as Cheiloscopy (1). Lip prints are wrinkles or grooves present in the transition zone of human lip between inner labial mucosa and outer skin. These wrinkles or grooves present on the lips have been named by Tsuchihashi as "sulci labiorum rubrorum" (2).

Identification through lip prints is same as finger print. As finger prints are used for absolute identification, similarly lip prints are used for the same. But nowadays identification through lip prints is gaining attention as criminals are taking precautions like the use of gloves or silicon thumbs, so that their finger prints may not be identified. Like finger prints, lip prints are also unique to the individual. The location of lip print at the scene of crime gives much valuable information about the individual and his habits e.g. lip prints on drinking glass or on a cigarette.

Since 1950, Japanese have carried out extensive research in the matter of cheiloscopy. Tsuchihashi in Japan studied lip print impressions called "KO SHIMON" (mouth fingerprints) in Japanese. Based on research done by Suzuki and Tsuchihashi (3), it was established that the arrangement of lines on red part of human lips is individual and unique for each human being.

The lip prints being uniform throughout life and characteristics of person can be used to verify the presence or absence of a person from the crime (4) provided there has been consumption of beverages, drinks, usage of cloth, tissue or napkin etc. at the crime scene. A careful glimpse of the lips instantly tells us the mood of the individual. Lips are the most expressive, mobile and flexible feature. Besides its role in identification, can be used to verify the presence or absence of persons/suspects from scene of crime by comparing the pattern of lipstick smear with that of the suspect. The lipstick stain present on suspects clothing in a crime scene investigation serves as an indirect evidence and can be used as a link between suspect and the cosmetic using victim. Similarly, smears can also be found on other objects like glasses, cups, wood, cigarette butts and indicate some kind of relation between suspect and crime scene (4). It is also possible to extract "saliva DNA" from lipstick print which might link a suspect to their presence at the crime scene. But the present article reviews which media (like glass, porcelain, cloth or wood) will elicit the clear lip print so that the investigations of crime can be solved.

### Aims:

1. To identify the lip print patterns on different media.

### Material and Methods

The study has been conducted in the department of Forensic Medicine & Toxicology of Government Medical College, Srinagar amongst the medical students of age group 19-21 years after taking the verbal consent and study completed in around 2 months. The sample size was 100, 0 males and 50 females. After making the allowance for withdrawal due to exclusion criteria the sample size comes out to be 75, 35 males and 40 females.

### Inclusion criteria

1. Students of Government Medical College Srinagar of age group 19-24 years.
2. Students who are cooperative and ready to give valid consent to participate in the study.
3. Students having lips free of disease and deformity.

### Exclusion criteria

1. Students having history of allergy to lipstick.
2. Students with any kind of pathology like infection/inflammation of lips, injury or deformity, scar or type V lip print pattern.

### Materials used in the study

1. Lipstick (dark colour).
2. Porcelain cups (white colour).
3. Glasses (transparent).
4. White cotton cloth.
5. Wooden pieces.
6. Cotton balls.
7. Magnifying lens.

### Procedure

The demonstration regarding the recording of lip prints was explained to the students. The students were asked to properly clean their lips with water and dry them. Apply lipstick over the lips evenly starting from the center and moving up to the vermilion border. The upper and the lower lip are rubbed together properly prior to taking the lip prints in order to ensure that lipstick was spread evenly over the lips. The lipstick was allowed to dry for two minutes. Then the students were asked to be stationary and apply their lip print of lower lip one by one over the articles (lipstick refreshed each time for each article) viz. porcelain cup, glass, white cotton cloth and piece of wood. After the procedure was completed, for all the students, lip

prints were studied by using magnifying lens, identified and results were recorded in excel.

The lip prints were studied by the naked eye examination and classified according to Tsuchihashi and Suzuki system of classification (5).

**Type I:** Clear cut groove running vertically across the lip.

**Type I':** Partial length groove of Type I.

**Type II:** Branched pattern.

**Type III:** Intersecting pattern.

**Type IV:** Reticular pattern.

**Type V:** Other patterns.

Type V lip print pattern was excluded from the study since it did not fall in any of the categories, also it cannot be differentiated morphologically.

### Results

**Table no. 1:** Articles eliciting lip print patterns.

Articles	Clearl y visibl e	Faintl y visibl e	Not visualis ed	Tot al
1. Glass	71	04	0	75
2. Cup	59	11	05	75
3. Wood	33	28	14	75
4. Cloth	14	28	33	75

Lip print pattern clearly visualized from glass followed by cup then wood and lastly on cloth.

### Discussion

The most commonly used scientific method for forensic identification are fingerprints and dental record comparisons (6). Lip prints have the ability to distinguish individuals and hence can be used as a potential tool in human identification purposes (7).

Cheiloscopy deals with examination of furrows on the red part of human lip and is an important tool in forensic sciences just similar to fingerprints and DNA analysis (7) (8).

Based on the lip prints, the mucosal area of the individual lips is pivotal as far as identification is considered and this is called as Klein's zone. This zone is covered with grooves and wrinkles which form a characteristic pattern called as lip print, which are unchangeable and permanent like finger print and palatal rugae (9). Obtaining lip prints is highly sensitive technique as it depends on various factors like amount of pressure applied, direction and method used in making the print as well as the amount of lipstick used for developing lip print (10).

Collection of lip print with suitable transferring and recording media is important.

Lip prints left at the crime scene help in identification of suspect when proper comparison is done (11).

The present study shows that the lip print pattern is clearly visualized on glass surface followed by porcelain cup, then wood and lastly on cloth.

The study was compared with study conducted with study conducted by Singh et al, which showed that cup showed significantly higher good lip prints developed as to both satin and cotton while satin was found to have significantly higher good lip prints developed as compared to cotton. Results of this study were same as that of the above study (12).

A study by Castella A et al showed that lysochromes are very effective when used on long lasting lipstick prints on porous surfaces, such as paper or fabric where detection is usually difficult (13).

The study conducted by Dolly et al, satin fabric and cup yielded better results as compared to cotton fabric probably due to greater absorbance of lipstick content by the cotton. The smoother and uniform surface of white clay cup and satin fabric are better for the development of lip prints than cotton fabric. Results are consistent with the present study.

The results of the present study are in accordance with the above studies as the clearly visible lip prints are seen on the glass and cup surfaces and least on the wood and cloth surfaces. The benefit of the present article is that we have used four different medias as compared to the above studies which used two or three medias only.

The major shortcomings of lip print analysis are regarding the permanence of various lip print patterns. Even though they are believed to remain unchanged throughout one's life. Various studies have reported that major trauma to the lips can result in scar formation; also any surgical treatment carried out to correct any abnormality can affect size and shape of lips and alter morphology and pattern of lip prints. The lip prints produced may vary in appearance as the lip grooves are present on the exposed part. Hence, this requires further study to establish the uniqueness of lip grooves, to develop standard protocols for collecting and analyzing lip prints (14).

Cheiloscopy is applicable mostly in identifying the living, since lip prints are usually left at crime scene and can provide direct link to the suspect (14).

### **Recommendations**

A database of lip prints should be created for all criminals especially the ones with persistent criminal record so that these identification tools can be put to their best use as evidence to trace the offender.

1. Lip prints record of public should be created and consolidated in correlation with record of identity for social masses to have a data bank for specific identification of each individual resident which can be of utmost help in speculation of crime and mass disasters for e.g. The unique identification no. In form of Aadhar card has these details but are not shared with investigation agencies.
2. Training and workshops of medical and police personnel should be conducted to highlight upon importance of collection of samples lip prints in dead bodies and from scene of crime, so that, trace evidences located at scene of crime can be cross matched to victim and accused for legal purpose.
3. Lip-prints in conjunction can be used for establishing the identity in unknown cadavers and also prove helpful in gender discrimination in mutilated bodies. For this purpose, more and more studies should be conducted I various parts of the country to develop a profile of trend of occurrence in various regions and different communities.

### **Conflict of Interest**

None.

### **Ethical clearance**

Not required

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