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CHEILOSCOPY AS AN ADDITIONAL FORENSIC PARAMETER: A REVIEW

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ABSTRACT:
Criminal activities involving human life always puts lives at stake. Newer advances in other fields especially medicine and dentistry is essential in solving the mysteries of death. Different disciplines insert a part of the puzzle until it is complete. Fingerprints, DNA profiling, Forensic anthropology are commonly employed in personnel identification, mass disasters and others. Investigators may also rely on lip prints to identify possible suspects or to support evidence gained in specific investigations. A lip print at scene of crime can be the basis for inference as to the number of people involved, gender, habits, occupational traits, and others, based on the pathological changes present. This review deals with lip prints and their possible acquisition and usage.

Keywords: Lip print, Cheiloscopy, Forensic investigation, Lip tracing, Crime, Lips

INTRODUCTION:

Mathew Arnold stated that, “Truth sits upon the lips of dying men” [1]

The positive identification of living or deceased persons using the unique traits and characteristics of the teeth and jaws is a cornerstone of forensic science. Lip prints have been with us since the beginning of man, similar to the prints on a person’s finger, palm and foot which are unique to that individual and are used for identification [1,2]. The external surface of lip has abundant elevations, wrinkles and grooves on labial mucosa called sulci laborium noted originally by the anthropologist R. Fischer in 1902 [1,2,3]. The use of lip prints in personal identification was first recommended in France by Edmond Locard [2,4]. Until 1950, anthropology simply stated the existence of lip prints without affirming a pragmatic use, until Synder conducted an investigation on traffic disasters and proved that the characteristics of lips are individually distinctive [1,2,3,4]. In the

period 1968-1971 two Japanese scientists, Y. Tsuchihashi and T. Suzuki at Tokyo University established that lip prints are unique for each human being [4,5]. Since then widespread research on lip patterns are going on with an intention of using them for personal identification and evidential work in legal proceeding. The importance of cheiloscopy is linked to the fact that lip prints are genetic, developing at the 6th month of intrauterine life and are stable, constant even after death, and exclusive to each person except in monozygotic twins [6]. A lip print at the scene of a crime can be a center for ruling the disposition of the event, the number of the people involved, sexes, cosmetics used, habits, occupational traits, and the pathological changes of lips themselves [4].

Documentation of Lip Prints:

Other than the visible prints, there can be formation of latent or persistent lip prints due to the minor salivary and sebaceous glands on the lip and the moisturizing action of tongue. These can be obtained from clothing, cups, glasses, cigarettes, windows, doors [4,6,7]. Recording these prints is a delicate process and various methods have been tried to establish the exact patterns.

Transfer mediums: Lipstick, lip rouge, or other suitable transfer mediums can be applied to the lips and lip prints can be recorded on a strip of cellophane tape on the glued surface, which can then be transferred to a white paper and subsequently be visualized with the use of the magnifying lenses [1-7] [Figure 1]

Williams suggested that after lipstick is applied to the lip, multiple records or several “sets” of lip prints should be taken, with the mouth in a particular position, such as pursed in order to ensure that all parts of the lips are recorded [8,9]. The latent prints can be lifted using materials such as aluminum powder or magnetic powder [6]. Conventional powder methods for lip prints are unsuitable, as the brush tends to smear or leave streak marks on the print which may be interpreted as false characteristics.

The oil content in long lasting lipsticks can interfere with the conventional powders used [8,9]. When the effectiveness of several fingerprint powders and reagents on lipstick prints was analyzed by a study, red (Dragon’s Red), fingerprint black, and silver metallic powders were found to be the most effective [8].

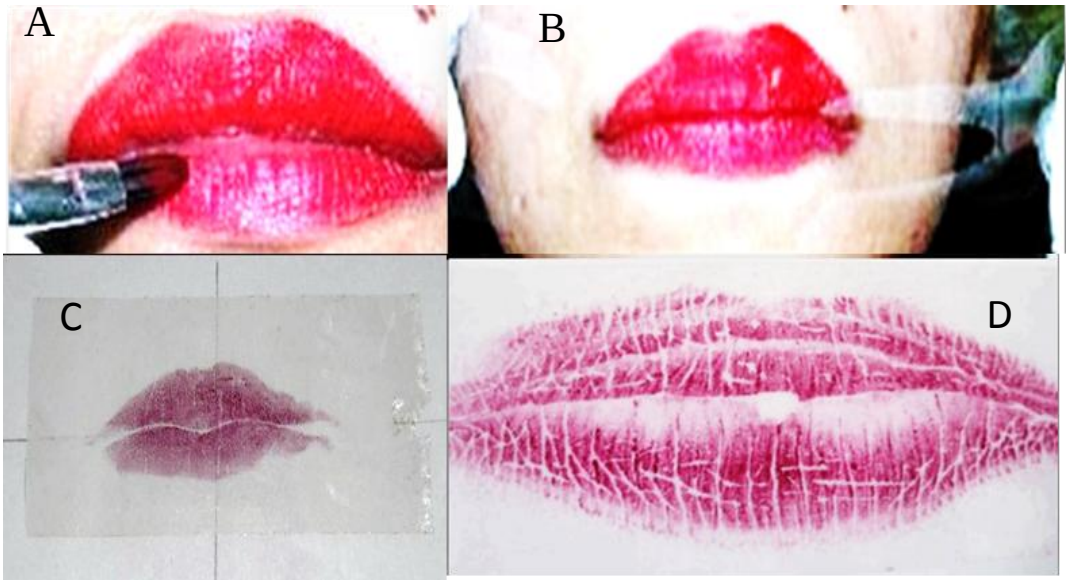

Figure 1 : A – D Shows the procedure of recording of lip print using cellophane tape [14]

Williams also suggested powdering method using magna brush and magnetic powder wherein lip prints are recorded on glossy porous surface or a smooth nonporous surface and then subjected to a heat source until they solidify [9].

Lysochrome is a generic term for compounds that have the ability to dye fatty acids and are better than chemical agents because they react with fats and physical reagents and provide sufficient time to work even when little reagent is used as shown by Alvarez et al [10]. Kumar et al conducted a study to analyze and compare the effectiveness of lysochrome dyes (Sudan III, Sudan black and Oil Red O) with fluorescent dyes in development of latent lip prints and found flouroscent dyes to be better in documentation of the prints [6]. Finger printer, a special roll, usually used for finger print collection, can also be used on the lips to record their pattern. Alvarez et al conducted a study on latent lip prints and concluded that the developing method of lip prints is no different from that used in the case of fingerprints and so no special equipment was needed [8].

Photography:

Proper lighting is essential to accentuate contrast on a non porous surface. Errors are common as the central area and the angle of the lips are never in the same plane leading to blurred or

partial images of the lips. The dawn of digital photography has wiped out this error [2, 8]. In deceased persons, lip prints have to be obtained within 24hours to prevent them from post mortem changes [11].

Classification:

Lip prints were classified by Santos in 1967 [2, 12] into 4 variants: Straight line, Curved line, Angled line and Sine-shaped line. These lines again may be arranged as vertical, interspersed, brachial, reticular and undiffered. In 1970, Suzuki and Tsuchihashi gave a new classification which is highly followed by most [2,13]: Type I: Vertical, comprising of complete end-to end longitudinal fissures; Type I': Comprises of incomplete versus longitudinal fissures; Type II: Branching Y shaped pattern; Type III: Interspersed groove – criss cross pattern; Type IV: Reticular - chequered pattern fence like and Type V: Others/ Undifferentiated (Figure 2).

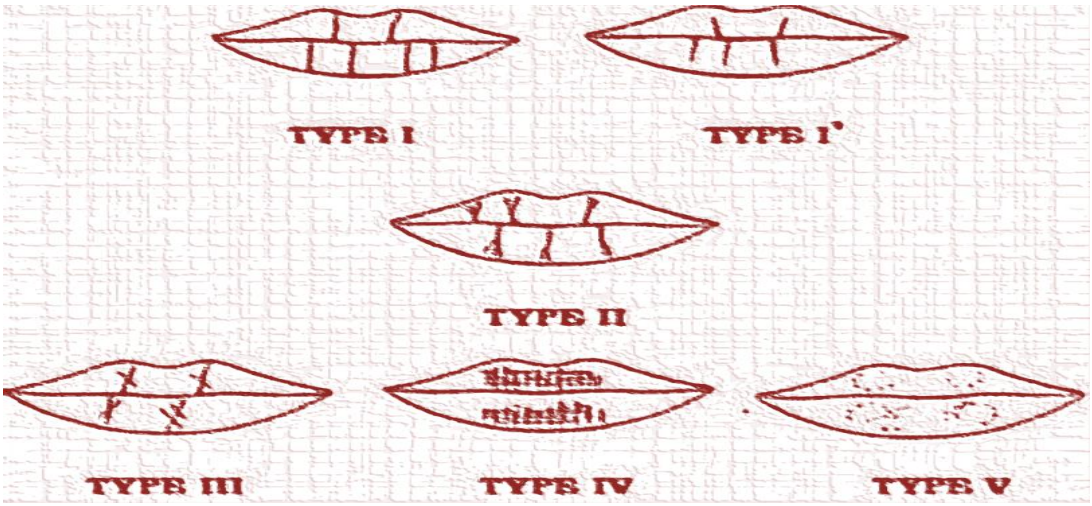

Figure 2 : Suzuki and Tsuchihashi s classification of Lip [7,15]

Various studies have been conducted with the objective of determining the most common lip patterns and their distribution in either sex. Sharma et al [13] Randhawa [14] and Vahanwala S [15] proved that type 1 and 1' are more common in females; but variation in the distribution of patterns i.e Type II, type IV and type III were common in males as seen by the same authors respectively. Verma P et al [3] and Sivapathasundram et al [7] showed type II to be dominant in both male and female population. In a study by Narang et al [5] the accuracy of

cheiloscopy in sex determination was 86.40%. These disparities maybe due to difference in pressure exertion, direction and method used for recording lip prints as these are present in transition zone of lips which is highly mobile. Age changes like immaturity of lips in juveniles and reduced anatomic details and tonicity in the aged can also have a considerable effect on the lip pattern, thereby making the correct identification of sex in these groups contentious [6]. This discrepancy highlights the call for sole consistent procedure for print collection [13]. There were similarity in the lip prints of mothers and daughters found by Augustine et al [16] and Yats et al [17]. There have been various studies conducted based on the correlation of fingerprints and blood groups with that of the lip patterns, but variable results have been documented owing to the smaller number and disparity of population based studies [3,11,17]. Studies have also shown that saliva and DNA retrieved from the exfoliated cells found in the lip prints as the furrows and grooves on the lips seemed to facilitate routes for saliva to spread over the lips to maintain good hydration [13,14].

Lip prints in Biometrics:

Over the last three decades there has been tremendous research done on development of systems based on fingerprint, face, iris, voice and others [16] Michal Choras has re-affirmed the belief in his recent studies that the lip can be used as a primary biometric modality for successful identification purposes [18]. Lukasz Smacki has also proposed a method of lip print digitization and usage in identification [18]. Lip print based system offers the advantage of being used in conjunction with face and voice based systems so as to enhance their performance. In addition to this development of lip based authentication system will also be beneficial in forensic applications [4, 18].

CONCLUSION:

Lip prints are considered unique to an individual and analogous to fingerprints. Lip print analysis is a process that provides both qualitative and quantitative results, thus its application in the forensic field should be widely accepted by both law enforcement and the legal professionals. The collection of the visible as well as latent lip prints with a suitable transferring and recording media is important for its consideration as positive forensic evidence and that identity can be established by a combination of methods which makes the identification process relatively flawless. In addition, newer advancements in techniques, equipment, methods and teaching will have to be developed. Similarly we believe that various studies have to be carried over a wider class of individuals in order to establish the individuality of the lip prints.

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