



Original communication

## Inheritance pattern of lip prints among Malay population: A pilot study<sup>☆</sup>



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### ABSTRACT

We assessed the resemblance of lip print patterns between parents and biological offspring in families of 31 Malay students as well as the distribution of different types of lip print in the study group. Only a few studies have successfully established the inheritance pattern of lip prints. Such studies can be population specific and need to be conducted in various populations. No such study have been conducted in Malay population in Malaysia, according to our knowledge. Present study was carried out to ascertain whether there is any inheritance pattern in lip prints and thereby to investigate the potential role of lip prints in personal identification. We found 58.06% resemblance of lip print patterns between the parents and their biological offspring in our study. The influence of heredity in lip print pattern is still a new concept and there is lack of concrete evidence. The data from our study shows that there is potential influence of inheritance in the lip print patterns among the family members. Further researches involving larger samples size are suggested to derive more reliable and accurate results.

The most common lip print pattern among the study group is type I (29.84%) followed by type II (23.12%), type III (22.45%), type I' (13.44%), type IV (9.54%) and type V (1.61%). Racial variations in lip print patterns and their prevalence may serve as an aid in forensic identification and crime scene investigation. The results of this pilot study will help in establishing guidelines for future researches on lip print analysis in Malaysia.

**Context:** Lip print patterns are unique and individualistic. However, there are some similarities in basic patterns of lip prints between family members which may be attributed to influence of inheritance.

**Aims:** 1. To determine the inheritance pattern of lip prints among Malay family members of the student. 2. To identify the distribution of different types of lip prints among Malay population.

**Settings:** and **Design:** Observational pilot study.

**Methods and material:** Lip prints of 124 individuals from 31 families consisting of father, mother and two children were recorded and classified based on Tsuchihashi Classification (1974).

**Statistical analysis used:** Statistical analysis was performed for resemblance pattern among family members (Karl–Pearson Correlation Coefficient) and inter-observer variability (Kappa test).

**Results:** 58.06% positive resemblance was found between parents and biological offspring. The highest lip print pattern in the study group was type I (29.84%) and the least was type V (1.61%).

**Conclusions:** There is positive resemblance in lip print patterns among family members which may be attributed to influence of inheritance. However, further studies with larger sample sizes need to be conducted to confirm the results. Type I lip print was the most prevalent pattern among the study subjects.

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<sup>☆</sup> Key Messages: Establishing inheritance pattern of lip prints may aid in personal identification. Further research with larger sample size is required to define reliable guidelines towards the same.

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## 1. Introduction

Lip prints are the normal lines and fissures in the form of wrinkles and grooves present in the zone of transition of lips between inner labial mucosa and outer skin. These wrinkles and

grooves have been named by Tsuchihashi as 'sulci labiorum rubrorum'<sup>1</sup> and the examination of lip print is referred as 'cheiloscropy'.<sup>2</sup> These grooves pattern are heritable and are supposed to be individualistic.<sup>3</sup> Thus, lip prints can be used for criminal identification, much like fingerprints but they have a limited role in forensic identification. Lip prints are unique and do not change during the life of a person.<sup>4</sup> It has been verified that they recover after undergoing alteration. The disposition and form of the furrows also does not change with environment factors.<sup>5</sup>

Classification of lip print patterns was described in detail by Japanese doctors, Suzuki and Tsuchihashi in 1974.<sup>1</sup> They divided the lip print patterns into six types.

1. Type I: Clear-cut vertical grooves that run across the entire lip.
2. Type I': Similar to Type I, but do not cover the entire lip.
3. Type II: Branched grooves.
4. Type III: Intersected grooves.
5. Type IV: Reticular grooves.
6. Type V: Grooves that cannot be morphologically differentiated

Tsuchihashi's study also includes formulation of the widely used lip prints classification and they also suggest that lip prints are exhibited specific to an individual. They reported that lip prints of the twins and their parents were not identical and their lip groove pattern could be influenced by hereditary factors. This finding was important due to the fact that both uni-ovular twins contain the same DNA but not the same finger prints and lip print.<sup>1</sup>

A study involving 600 individuals was done by Augustine J. et al. in 2008 to classify lip pattern and document common pattern and their variation to evaluate any differences between the sexes and different age group. They also tried to ascertain whether there is any hereditary pattern in lip print.<sup>6</sup> Venkatesh et al. in 2011 analysed the lip pattern among family members and between twins.<sup>7</sup> Study on inheritance and lip print also had been carried out by many other researchers.<sup>8–10</sup>

In relation between hereditary and lip pattern, Augustine J. et al. (2008) found that there is resemblance between mothers and offspring and positive resemblance between fathers and offspring. The study shows that positive hereditary pattern does exist between parents and offspring but there is no particular paternal or maternal influence on the pattern.<sup>6</sup> However, study done by Shilpa P. et al. (2010) found that there is no statistical correlation of lip print with family members or even any correlation between blood group and lip print.<sup>8</sup> Venkatesh et al. (2011) analysed the lip prints among family members and in between twins and the study revealed different pattern on the whole with few similar grooves suggesting the existence of hereditary in the lip prints.<sup>7</sup> Vats Y. et al. (2011) stated that there is similarity of lip print patterns among parent and their offsprings but no association is found in lip print patterns of monozygotic twins.<sup>10</sup> Maheshwari et al. (2011) tried to establish that there is no similarity in lip print between parents and their twins or triplet. The results showed no familial or genetics similarity of lip prints between parents and children, parents and twins or between twins, parents and triplet and among triplets.<sup>9</sup> As stated by Tsuchihashi and Suzuki studies, lip prints are unique and individualistic to each person; but basic lip prints patterns could still have some similarities between the family members, indicating the possibility of inheritance pattern of the lip prints. Establishing the inheritance pattern will aid in personal identification and also to determine the familial lineage of a person.

We assessed the resemblance of lip print patterns between parents and biological offspring in families of 31 Malay students as well as the distribution of different types of lip print in the study group. Only a few studies have successfully established the inheritance pattern of lip prints. Such studies can be population specific

and need to be conducted in various populations. No such study have been conducted in Malay population in Malaysia, according to our knowledge. Present study was carried out to ascertain whether there is any inherence pattern in lip prints and thereby to investigate the potential role of lip prints in personal identification.

## 2. Subjects and methods

An observational pilot study was conducted involving 124 subjects from 31 families of Malay students of Melaka Manipal Medical College. The inclusion criteria were families consisting of father, mother and two siblings. The exclusion criteria were children below 15 years old, individuals with any lip pathology such as cleft lip, trauma or have previous lip surgery and also individuals with hypersensitivity to lipstick. Approval of the institutional ethical committee and written consent were obtained from the participants.

Inclusion and exclusion criteria were matched with consent and personal particular taken for each individual. Procedures and techniques were adapted from study done by Augustine et al. in 2008. The lips were cleaned using wet tissues and were applied with thin layer of lipstick using disposable lipstick applicator or sterile cotton bud. An impression of the lip prints were then taken by using a strip of cellophane tape which covers the entire lips including the philtrum and also the corner of the mouth. A gentle horizontal single stroke with index finger from the centre of the lips until corner of the mouth was given. The cellophane tape was then released starting from one side of the mouth until the other end and placed onto a white paper together with the individual's unique identification code. The impression was subsequently scanned and visualized by using Microsoft® Power Point. The lips were divided into six segments as shown in Fig. 1. The types of lines, furrows and branching were subjected to comparison and classification using Tsuchihashi's method by two independent observers. Both the observers refrained from assessing each other's data and the data was processed by the third observer. The third observer held the responsibility of determining the final type of the lip print pattern, in case of conflicted results between observer 1 and 2.

After the identification of the type of lip prints, the resemblances between the family members were subjected to comparison. Resemblance between two lip print was considered positive if more than three segments was of the same pattern. Data entry and statistical analysis was done by using Epi Info 7.0 and Graphpad.

## 3. Results

After assessing 124 individual lip prints from 31 families, there is 58.06% resemblance of lip prints between parents and their offspring.

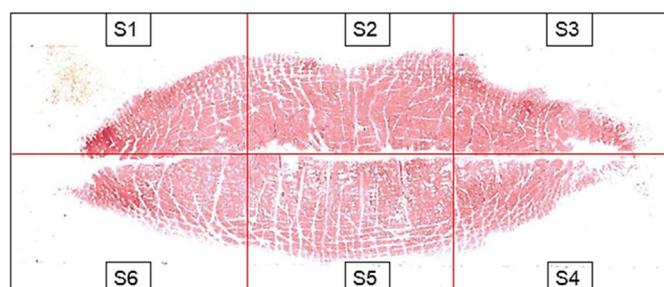


Fig. 1. Division of lip into six segments for analysis.

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