



## RESEARCH ARTICLE

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# Description of Lip Print Patterns (Cheiloscopy) Based on Age in the Population of Bojonegoro, East Java, Indonesia

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## ABSTRACT

Forensic dentistry is a branch of medical science that deals with identifying and examining evidence through teeth and evaluating and presenting findings related to the oral cavity, jaws, teeth, and oral soft tissues to determine a person's identity. One of the identification methods that can be used in forensic odontology is lip prints. This study aims to see and examine the appearance of lip print patterns (cheiloscopy) based on age in Bojonegoro, East Java, Indonesia. This research was a descriptive observational study with a cross-sectional approach and used the classification of lip print patterns proposed by Suzuki & Tsuchihashi. The research sample consisted of 100 people taken from the age group of toddlers, children, adolescents, early adults, late adults, early elderly, late elderly, and seniors. The results of this study indicated that the most common lip print pattern was type II followed by type III and type I. There was diversity and variation in lip print patterns in each age group in Bojonegoro, East Java, Indonesia. Possibly due to racial variations and subject maturity.

**Keywords:** forensic identification; lip print; cheiloscopy

## INTRODUCTION

The level of risk of being exposed to criminal acts in Indonesia is 103 in 2019 which includes crimes of theft, murder, immorality, and other crimes it can be interpreted that there are quite several crimes that require time and special authorities in the interests of justice to resolve<sup>(1)</sup>. The identification process is very important to provide psychological peace to the family with the certainty of the identity of the victim and perpetrator<sup>(2)</sup>. Courts, visum et repertum must be made by a forensic specialist, namely in making identification, medical statements, due diligence, and examining evidence in a criminal case<sup>(3)</sup>.

Forensic dentistry is a branch of medical science concerning how to handle and examine evidence through teeth and evaluate and present findings related to the oral cavity, jaws, teeth, and oral soft tissues by applying the knowledge of a forensic dentist so that finally be able to compare and match antemortem and post-mortem data accurately<sup>(4)</sup>. The field of forensic science usually uses fingerprints, dental records, and DNA testing for individual identification<sup>(5)</sup>. Apart from these three methods, other methods can be used in individual identification but their function is not widely known, one of which is lip prints. The lips are the two fleshy edges of the oral cavity which meet at the labial commissure. The lips consist of the mucocutaneous junction, lip margins, tubercles, and the vermillion border. The pattern of wrinkles and grooves on the red zone of the lips or the vermillion border, or Sulci labiorum forms a distinctive way<sup>(6)</sup>.

Lip prints left at the crime scene can provide clues about the type of case, the number of people involved, the cosmetics used, habits, and pathological changes in the lips themselves<sup>(7)</sup>. The unique and different characteristics of each human's lip prints can be used to identify a person. Lip prints can be used as strong evidence in a legal investigation process due to their unique and stable nature. An identification technique in forensic science that uses a pattern of wrinkles and furrows on the surface of the lip mucosa is cheiloscopy. Research on lip prints (lip prints) is still rare in Indonesia, even though in criminal cases lip prints are often found on glasses, wind instruments, and objects found accidentally left by perpetrators<sup>(8)</sup>.

Lip prints are one of the most interesting methods of identifying a person's identity apart from fingerprints, in certain special technical conditions such as fingerprints and DNA are not possible because they require a long time and cost a lot, thus requiring other alternatives for identification, and cheiloscopy can play a

role<sup>(9)</sup>. The awareness of modern identification techniques has caused criminals to be more careful at work, for example by using gloves. To deal with this, the fingerprint method is unable to provide positive identification, so investigators need alternatives such as cheiloscopy as supporting evidence if the perpetrator leaves lip prints<sup>(10)</sup>. Because lip print patterns are unique and stable, the authors are interested in conducting research on lip print patterns (cheiloscopy) based on a person's age.

## METHODS

This type of research was descriptive observational with a cross-sectional approach using the classification of lip print patterns proposed by Suzuki & Tsuchihashi. This research was conducted in Bojonegoro District, Bojonegoro Regency. The population used in this study were the people of Bojonegoro Subdistrict, more precisely in the Kadipaten Village, Banjarjo Village, Campurejo Village, Kauman Village, Karang Pacar Village, and Kepatihan Village. The population in this study was divided into several age groups: toddlers, children, adolescents, early adults, late adults, early elderly, late elderly, and seniors. This study used the proportionate stratified random sampling technique and obtained 100 samples as listed in the table 1.

Lip print steps were:

1. Clean the lip area using a wet tissue.
2. Lips apply lipstick using a cotton bud until evenly distributed over the entire surface of the lips.
3. Prepare a clear tape which is then glued to the surface of the lips in a closed and relaxed state.
4. Press gently so that the lip print pattern sticks well.
5. Gently peel off the clear tape from one direction.
6. Paste the printouts and clear tape on white paper to be served permanently.
7. Provide information on the name and age on the white paper as the subject's identity and then document it in a photo.
8. Each lip print is divided into 6 parts to simplify the identification process. The identification process uses the classification of Suzuki & Tsuchihashi<sup>(11)</sup>.

Table 1. The sample size

Village	Sample size
Kadipaten	15
Banjarjo	24
Campurejo	20
Kauman	13
Karang Pacar	18
Kepatihan	10

Table 2. Identification methods with Suzuki and Tsuchihashi Classification<sup>(11)</sup>

Lipprint type	Description	
Type I	Vertical groove pattern on all parts of the lips	
Type I'	Looks like type I but not all over the lips	
Type II	You can see the branching pattern	
Type III	You can see the cross-flow pattern	
Type IV	You can see the pattern of the groove that forms the boxes	
Type V	A groove pattern that is not found in other types	

## RESULTS

Research on the description of lip print patterns based on age was carried out in Bojonegoro District. The sample taken were 100 people and were taken from subjects based on age groups in the Kadipaten Village, Banjarjo Village, Campurejo Village, Kauman Village, Karang pacar Village, and Kepatihan Village.

Lip prints with selective samples were carried out using red lipstick which is spread evenly on the entire surface of the lips, then the tape was attached to the lips and slowly the tape was removed from the lips through the right or left side, after that the tape was attached to plain white paper so that the lip prints were not printed, changeable and identifiable. Based on observations by 2 observers, the data taken were then identified by lip print according to type and displayed in the form of table 3-4.

Table 3. Distribution of age

Age (years)	Frequency	Percentage
0-4	8	8
5-14	15	15
15-24	14	14
25-34	14	14
35-44	15	15
45-54	15	15
55-64	12	12
65+	7	7

Table 4. Distribution of lipprint types and age groups

Age (year)	Lipprint type									
	Type I	Type I'	Type II	Type III	Type IV	Type V				
f	%	f	%	f	%	f	%	f	%	
0-4	3	20	0	0	3	7	2	7	0	0
5-14	4	26	2	29	8	20	0	0	0	1
15-24	0	0	1	14	5	12	7	27	0	0
25-34	1	7	1	14	4	9	3	12	0	0
35-44	1	7	1	14	6	15	6	23	0	1
45-54	2	13	1	1	8	20	3	12	1	100
55-64	1	7	1	14	6	15	3	12	0	0
65+	3	20	0	0	1	2	2	7	0	0

Table 3 shows the number of subjects in each age group. The least number of subjects was in the elderly or 65+ years group, which was 7 subjects, and the highest number of subjects were in the 5-14 year age group, 35-44 years old, and 45-54 years old with 15 subjects.

Table 4 shows the distribution of subjects based on the type of lip print and age group in the population of the Bojonegoro sub-district, which is presented in the form of nominal amounts and presentations. The most common types at age 0-4 were type I and II, at age 5-14 years were type II, at age 15-24 years were type III, at

age 25-34 years were type V, and at age, 35-44 years were type II and III, age 45-54 years was type II, age 55-64 years was type II, and age 65+ years was type I.

Subject distribution data based on lip print pattern types are also shown in Figure 1-2.

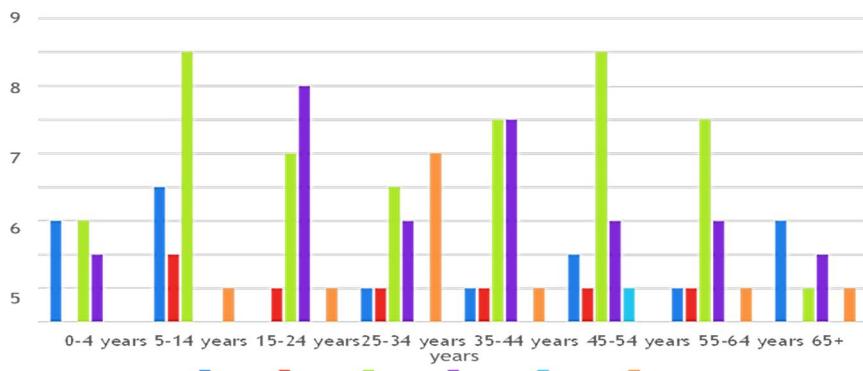


Figure 1. Subject distribution by lipprint type and age group

Figure 1 shows that each type's study results are based on lip print patterns. The most common types found in each group were; there were 2 age groups 0-4 years, namely, type I as many as 3 people (38%), and type II as many as 3 people (38%); the age group 5-14 years type II as many as 8 people (53%); age group 15-24 years type III as many as 7 people (50%); the age group of 25-34 years type V as many as 5 people (36%); age group 35-44 years there were 2 types, namely type II as many as 6 people (40%) and type III as many as 6 people (40%); the age group of 45-54 years was type II as many as 8 people (53%); the age group 55-64 years was type II as many as 6 people (50%), and the age group 65+ years is a type I as many as 3 people (43%).

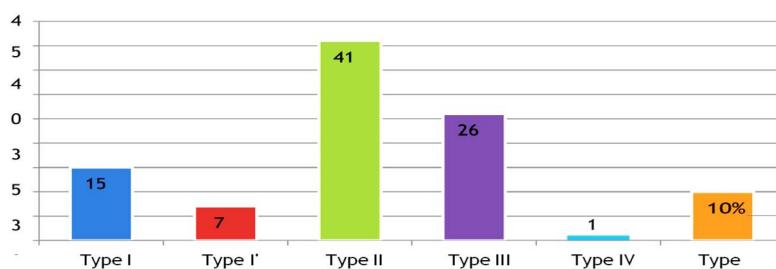


Figure 2. Subject distribution by lipprint type

Figure 2 shows the overall distribution of the most common lip print patterns found for all of Bojonegoro District. The following order was type II (41%), type III (26%), type I (15%), type V (10%), type I' (7%), and type IV (1%). For all of the above phenomena, the most commonly found was type II (41%) and the least was type IV (1%).

## DISCUSSION

This research was conducted in Bojonegoro District, Bojonegoro Regency, to be precise in six villages, namely the Duchy Village, Banjarjo Village, Campurejo Village, Kauman Village, Karang Pacar Village, and Kepatihan Village. The study's results in Table 4.1 show the distribution of subjects by age group. The number of subjects for each age group is determined proportionally based on the population of each age group. While Table 4.2 and Figure 4.1 are the distribution of subjects based on the type of lip prints and age groups in the population of the Bojonegoro District, Bojonegoro Regency. The results in all age groups based on the type that was most commonly found were in the order of type II, type III, type I, type V, type I', and type IV.

Most of the population in the Bojonegoro sub-district comes from native Javanese land and belongs to the Deutro-Malay sub-race <sup>(1)</sup>. In this study, type II was found in 41 (41%), type III was found in 26 (26%), and type I was found in 15 (15%). This is in line with Dini's research <sup>(12)</sup> which examined 80 people of the Deutro Malay sub-race and the most commonly found were type II, type III, and type I. Type V is a type with a random pattern not found in other types and not specific to the subject. anywhere. In this study type, V was found in 10 (10%). Mahmudah <sup>(13)</sup> found the fact that type V very rarely appears in various types of lip prints in research samples and is not the dominant type in certain population groups. Type I' is a type that is similar to type I, which is both vertical but not on the entire surface of the lips. Type I' was found in as many as 7 (7%) of the research data. According to Oktaviani <sup>(14)</sup> type I' is usually dominant in the Proto-Malay Sub-Race (Old Malay). Oktaviani researched the description of the pattern and lip prints of mixed ethnic groups between Gayo, Aceh,

and Malay involving 54 subjects. The Gayo tribe is a Proto-Malay sub-race, and most lip prints found are type I' in the mixed Gayo and Acehnese tribes. Type IV in this study was at least 1 (1%). Verghese et al<sup>(15)</sup> revealed that this is because type IV is usually most commonly found in the Caucasoid Race.

Lip print patterns are not the same between individuals and can be influenced by racial variations<sup>(16)</sup>. Indonesia has identical ethnic diversity based on the region of origin and racial diversity as seen from the physical characteristics of each individual. The time of arrival and the area occupied for the first time are among the factors that influence race in Indonesia. The Indonesian Malay sub-race can be divided into 3 sub-races, namely Proto Malay (Old Malay), Deutro Malay (Young Malay), and Primitive. The ethnic groups in Indonesia who are descended from the Deutro Malay people are the Javanese, Malays, and Bugis. The Deutro-Malay sub-race is the ancestor of the Indonesian nation which, if seen from its physical characteristics, belongs to the Mongoloid people. They came to the archipelago in the second wave (400-300 BC) via the western route and managed to seize several areas of Indonesia, one of which was Java, so that these people became attached to the Javanese tribe<sup>(17)</sup>.

Figure 4.2 shows the overall distribution of the types of lip print patterns found for all Bojonegoro Districts. There is a type of lip print pattern that is most commonly found in type II and a type of lip print pattern that is rarely found in type IV. Type II is most commonly found because the residents of the Bojonegoro area in the Java region are classified as the majority of the Javanese ethnic group, and are descendants of the Deutro Malay sub-race who have physical characteristics of the Mongoloid race<sup>(1)</sup>. This is in line with Saleh's research<sup>(18)</sup> which states that the majority of lip print patterns in the Deutro Malay sub-race are type II. This research was also supported by research conducted by Diksha et al<sup>(19)</sup> on 30 people from the Mongoloid race, the results showed that the most common lip print pattern found in the Mongoloid race was a branched pattern, namely, type II. In line with several previous studies, namely the research of Jannah<sup>(20)</sup> and Pulunggono<sup>(21)</sup> on Javanese Ethnicity, it was found that lip print patterns in Javanese were dominant type II, this was further strengthened by Dini's research<sup>(12)</sup> which was conducted on 80 individual students of the Deutro Malay Sub-Race Faculty Padjadjaran University Dentistry Class of 2010-2014 and it was found that the type that was most commonly found was type II.

The diversity of lip print patterns in each age group can be influenced by genetic factors. Genetics can affect physical characteristics (morphology, anatomy, and physiology), one of which is the pattern of parent and child's lip prints. The unique characteristics of each individual's lip prints are still different even though they have the same blood relationship but it still allows for the shape of the type of lips and a bit of a similar lip pattern<sup>(22)</sup>. This statement is supported by research conducted on the population of Upper Egypt and it was found that there was a closed nature, where the majority of the population were in family habits that tended to marry each other and had limited internal immigration to Egypt and out of Egypt. The results showed that there were genetic similarities from the results of marriages with fellow local areas, but it turned out that statistically significant differences in lip print patterns were found between individuals of all ages in the area<sup>(23)</sup>.

Age does not affect changes in lip print patterns, it's just that age maturity affects the depth and shallowness of the groove pattern. This study found many variations of lip prints in each individual based on age group which is determined by the type or pattern of lip indentation. In line with research conducted by Randhawa<sup>(24)</sup> and Augustine et al<sup>(25)</sup> which was conducted on three age groups, namely group 1: 1-20 years, group 2: 21-40 years, group 3: 40 years, and over. In the age group 1, Type I is the most common pattern, followed by Type II and Type III. In the age group 2, Type I was the most common, followed by III and IV. Type I was most commonly found in group 3, followed by III and II. These results indicate that type I is found the most but is followed by a different type for each age group.

Randhawa, et al<sup>(24)</sup> also revealed that there is a change in the shape of the lip profile as a person gets older, starting from the age of toddlers to teenagers, it can be seen that the shape of the lip profile and grooves are slowly becoming more and more obvious, it's just that in the elderly and the elderly there is a slight change, starting from wrinkles appear on the skin and thinning of the lips so that the lips experience a loss of volume as a whole, where the inter-commissural distance, the height of the lips decreases, the groove pattern becomes deeper and the lip skin becomes drier, this is related to that the pattern of the lips will become clearer the grooves and curves with age someone to reach the age of lip maturity. When someone has reached the age of elderly, there will be changes, namely the appearance of wrinkles on the skin and reduced elasticity of the facial muscles so that it may slightly change the shape of the lip profile, without changing the type of lip curvature that has existed since birth<sup>(26)</sup>.

An overview of lip print patterns based on age in the population of the Bojonegoro sub-district, Bojonegoro Regency, obtained various types of lip print patterns. The types of lip prints in the population of the Bojonegoro Regency District are very diverse, ranging from type I, type I', type II, type III, type IV, and type V. Type II is the most dominant type of lip print because the population in the Bojonegoro District is in Javanese and belongs to the majority of the Javanese tribe who are descendants of Deutro Malays and have physical characteristics of the Mongoloid race.

## CONCLUSION

The conclusions obtained from this study are: 1) There is diversity and variation in lip print patterns in each age group in Bojonegoro District, Bojonegoro Regency. Possibly due to racial variations and subject maturity; 2) the majority of lip print patterns in the Bojonegoro population, Bojonegoro Regency, are type II. Possibly due to the influence of Race. Type II is the most commonly found because the residents of the Bojonegoro area are in the Java region and belong to the majority of Javanese tribes who are descendants of Deutro Malays and have physical characteristics of the Mongoloid race.

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