

A Study on Usage of Lip Prints for Personal Identification Among Young Adults

Annie Linda Franklin Jeba Selvanayagam¹, Mridul Umesh²

¹Department of Life Sciences, Christ University, Hosur Road, Bangalore, Karnataka.

²Department of Life Sciences, Christ University, Hosur Road, Bangalore, Karnataka.

ABSTRACT

The pursuit of reliable and non-invasive biometric identifiers has gained momentum in forensic science. Among the less explored modalities is cheiloscopy—the study of lip prints—as a potential tool for personal identification. This study examines the uniqueness, reproducibility, and perception of lip prints among young adults, aiming to evaluate their applicability in forensic investigations. A sample of 150 participants aged 18–25 was studied using standardized lip print collection and classification methods (Afchar-Bayat classification and Kasprzak lip classification). Results demonstrated significant uniqueness in lip print patterns with minimal intra-individual variability. Moreover, a perception survey indicated that most participants were unaware of lip prints as forensic identifiers, though a majority supported their usage when informed. These findings suggest that lip prints possess considerable potential for personal identification in forensic contexts, especially among young populations. Recommendations for standardization, digitization, and future large-scale studies are proposed.

KEYWORDS: Cheiloscopy, Lip Prints, Personal Identification, Forensic Science, Biometric Identification, Young Adults.

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INTRODUCTION

The sulci labiorum (wrinkles and grooves) present in between the labial mucosa and the outer skin is called lip prints. The technique used in forensic investigation and the study of lip prints is called Cheiloscopy. In a crime scene investigation the importance is given to the identification of the individual[1]. Lip prints are unique to each individual as similar to that of fingerprints. Cheiloscopy can be used for the identification of the individuals whether live, dead, decomposed or even mutilated this acts as a additional tool the forensic investigation.

The wrinkles and the grooves maintain the uniqueness and texture throughout their life time unless these is a damage in the lip. The prints in the lip can be identified in the 6th week of intrauterine life. Lip prints are permanent non-destructible and unchangeable during the entire life time . Even by the increase of the age lip prints does not change[2].

Lip prints are unique, but these prints are trace evidence in the crime scene and is not commonly found as of fingerprints. And also lip prints does not act as a direct evidence rather if a lip print is found it is taken as a corroborative evidence. Lip prints are most commonly found the cases like rape, burglary and the prints are found in the cigarette buds, drinking glasses and the body of the victim.

Afchar-Bayat classification

Afchar Bayat classification was developed in the year 1978 . it gives a detailed classification about the groove organization. The classification of the grooves are classified into seven types.

Table 1:Afchar-Bayat Classification[3]

A 1 : Vertical and straight grooves, covering the whole lip
A 2 : Like the former ,but not covering the whole lip
B 1 : Straight branched grooves
B 2 : Angulated branched grooves
C : Converging the lip
D : Reticular pattern grooves
E : Other grooves

Kasprzak lip print classification

Jerzy Kasprzak developed the Kasprzak lip print classification in the year 1990-2000. He gave a detailed description about the prints in the lip. He gave the individualization of each lip print while other classification gave the general description about the shape and the wrinkles and the grooves of the lip. a)eye;b)hook;c)bridge;d)line;e)dot;f)rectangle;g)triangle;h)group of dots; i)top furcation; j)bottom furcation; k)double eye; l)hexagonal arrangement; m)crossing lines; n)closing bottoms furcation; o)delta-like opening; p)simple opening; q)closing top bifurcation; r)pentagonal arrangement; s)branch-like top furcation; u) fence; v)branch-like bottom bifurcation; and w)double fence[4]

RESEARCH OBJECTIVES

1. To verify that whether the lip print patterns of every individual is unique and to analyze scope of the lip print pattern uniqueness
2. To prove that lip prints fall into distinct patterns such as grooves, curves, bifurcation and intersecting lines
3. To examine if the lip prints of men and women have specific patterns
4. To study the pros and cons of using lip print uniqueness in identifying people.

RELATED WORKS

In order to have an understanding of the research that has been carried out earlier a review of past literature was carried out and the reviews were as follows:

1. Laurance G webb et al (2001) [5], revealed that lip cosmetics are an excellent source of DNA with almost 80% of samples giving a result. However, artifacts are frequently observed in the DNA profile when chelex is used for the DNA extraction and additional DNA purification procedures are required to ensure that an accurate DNA profile is obtained.
2. Caldas T, Magalhaes T, Aforso A, (2007) [6] established identity using Cheiloscopy. The author presented the importance of Cheiloscopy is linked to the fact that lip prints are unique to a person, lip grooves are permanent and unchangeable. It is possible to identify lip patterns as early as the sixth week of for baby's life in the uterine. From that moment on, lip groove patterns rarely change, resisting many affections, such as herpetic lesions.
3. Gauri Mishra, Kannan Ranganatha, TR Saraswathi (2009) [7] in their article highlighted that no individual had single type of lip print in all the four compartments and found that intersecting pattern was most common, both among males and females.
4. Prabhu, et al (2013), [8] presented a published manuscript on the Cheiloscopy revisit. The author showed if the investigators can rely on Cheiloscopy as supportive evidence in specific investigation or not. The first research in Europe Hungary during 1961 was carried out about lip prints. The examinations started after lip traces had been found on a glass door at the scene of a murder. At this time, the usefulness of the lip traces for criminalistic identification was proven.
5. Ghimire et al. (2014) [9] proposed a study to analyze and compare quadrant-wise and sex-wise prediction of lip print pattern in Nepal population. The study involved (100 males and 100 females) (18-25 years) Nepalese undergraduate students of BPKIHS were selected. Only middle 10mm of both upper and lower lips were taken as a study area. Chi square test was used to analyze and compare the lip print pattern in all the quadrants of male and female. So lip print pattern can be used as an additional tool for personal identification and sex determination.
6. Vikas et al, (2014), [10] studied the lip groove patterns in all the quadrants of both male and female subjects to identify the sex, based on the patterns of the grooves of the lip prints. Lip prints were collected using Cheiloscopy. The author presented the importance of Cheiloscopy is linked to a person lip grooves are permanent and unchangeable.
7. Lawan Adamu et al (2015) [11] showed that in the lip print pattern in Nigerian population type five (31.39%) was predominant, followed by type three (24.18%), type four (18.70%), type one (14.87%), type two (10.29%) and least frequent was type one (0.57%) statistically significant association ($p < 0.05$) of lip print types with ethnicity was found in upper left lateral compartment (UCL) it was concluded that lip print shows ethnic difference.
8. Nagalaxmi V et al (2015) [12] had found Forensic identification of living or deceased though is a tedious job but is a comprehensive work involving the co-ordinated efforts of multidisciplinary team employing different techniques in the face of which it also involves various other accessory methods like cheiloscopy, palatoscopy, odontometry which are unique and show individual variations.
9. Anjaly Dolly et al (2016) [13] found that Serdon 3 dye and aluminium powder showed significant results when used for the development of visible lip prints ($p < 0.05$), but didn't give any significant result for the development of latent lip prints. Indigo dye gave significant result for development of both visible and latent lip prints ($p < 0.05$).
10. Manas Bajpai et al (2016) [14] had given that lip prints have to be obtained within 24 hours of the time of death to prevent the postmortem changes of the soft tissues. Lip print patterns depend upon whether the mouth is opened or closed. In closed mouth position, lip prints exhibit well defined grooves while in later position of the mouth exhibits ill defined lip prints which may be difficult to interpret.
11. Jeergal et al (2016) [15] showed that lip print distribution in Males and females displayed statistically significant differences in lip print patterns for different lip sites: lower medial lip, as well as upper and lower lateral segments. Only the upper medial lip segment displayed no statistically significant difference in lip print pattern between males and females.
12. Suriya Loganadan et al (2019) [16] has found that Type I' (30.28%) is the most dominant lip print pattern and Type I (1.39%) is the least dominant among the Deutero-Malay population. Besides, this study has shown that the similarity of lip print pattern between mother and the child (57.89%) is greater compared to the father and the child (42.22%).
13. Divyadharshini et al (2019) [17] recommended within the scope of forensic odontology, along with other means of forensic identification. Release of certain oil and moisture content from lips enable development of "latent" lip prints which was similar to latent fingerprints.
14. Ramanathan et al (2020) [18] found from their study that type 4 reticular pattern was significantly higher among diabetic patients and thus proved that lip prints may serve as a predictive tool in screening type 2 Diabetes Mellitus.
15. Tamara A. Anai, Adman Abd Alhameed Sulaiman, and Yasir Nader Hussein, (2021) [19] in their forensic dentistry studies on the morphology of the lips and the patterns, produced additional weapons for personal identification and also said lip prints are used to identify populations from each other.
16. Amal Rateb et al (2022) [20] The study's findings indicated a strong correlation between lip print patterns and hypertension in females Egyptian individuals as well as between fingerprint patterns and hypertension.
17. Abedi et al (2022) [21] summarizes current knowledge on the physical and chemical technique of Cp enhancement, identifies limitations, and provides suggestions for future research on physical applications of future research on practical applications of cheiloscopy as a forensic tool in criminal justice.

18. Nirmal Krishan (2022) [22]. concluded that Lip prints like any other impressions are one of the important types of prints for the analysis from the crime. With ever increasing crime rates in the world lip print could be considered as one more important type of impression
19. Emily ,Regan et al (2023) [23] found out in their study that there is no statistically significant difference of lip print pattern between individuals with and without parafunctional oral Habits .
20. Tania chaves et al (2023) [24] identified methodological variations between studies, including variations in the adopted definition of “similarity” indicative of heredity, that contribute to the discrepancy in results and, therefore, to the lack of consensus regarding the existence of heredity in lip prints.
21. Sultana et al(2024) [25] found that for all humans even for twins and individuals of the same family , lip prints are unique. Among males and females, the most common pattern in the middle 10mm of the lower lip is type three and type four respectively .
22. Preeti prabakarrrao thute et al (2024) [26] studied and found the asymmetry of fingerprint pattern and the higher ATD angle (greater than equal to 51o) were correlated with lower academic performance among medical students. These findings suggest potential directions for early academic intervention, provided multicentric studies are conducted in the future.
23. Aakash (2024) [27] has found two advantages of employing digital technology for lip print picture analysis include better visuals and easier recognition in addition to capturing the lip print pattern. The sex difference, distinctiveness, and pattern recognition are investigated and thoroughly analyzed based on previous studies .
24. Gopalakrishnan Thangavel et al(2024) [28] pointed out that Cheiloscopy emerges as the valuable method for identification in forensic odontology and reveal that type two as pre dominant pattern in the cities like Chennai, Trichy, Coimbatore and Tirunelveli while type one was prevalent in the Madurai population. The study concluded a statistically significant gender difference with variations in geographical locations.

RESEARCH METHODOLOGY OF THE STUDY

Type of Research Design used

- The researcher has used a descriptive research design to study the opinion among the respondents with regard to uniqueness of the lip prints and pros and cons of using the lip print uniqueness.
- The lip print pattern uniqueness will be explained through lip print descriptions. Data with regard to lip print uniqueness, usage scope, pros and cons for personal identification are described after collecting data from the respondents.

Type of survey conducted

The researcher has conducted a sample survey among young adulthood(18-35) in Sivakasi region of Tamil Nadu (India)

Sampling method

The researcher has used convenience sampling method

Sample size

The sample size of the study was 150

Type of data used

The researcher has used primary data that was collected from the study respondents.

Data collection methods

The following data collection tools are used for the study

- A structured questionnaire to collect data regarding demographics, opinion regarding uniqueness of lip prints and pros and cons of using the lip print uniqueness
 - Physical Collection of individual lip prints using lipstick and clear adhesive tape.
 - Materials used for collecting individual lip prints
1. Lip stick
 2. Magnification lens
 3. Clear adhesive tape
 4. Photo copies of the lip print taken

Physical lip print collection procedure

1. Lip stick is applied to the lip of the person with their consent
2. Then the print of the lip stick is taken with clear adhesive tape
3. After that it is pasted on to the paper and magnified with adobe photoshop for further analysis

Tools for Data analysis

The data would be analysed using Statistical package for social sciences (SPSS). The following tools for analysis were used

1. Descriptive statistics to describe the characteristics of the respondents
2. Chi square test was used as Inferential statistics
3. Factor analysis to identify the lip print uniqueness awareness factors and the factors for pros and cons of using lip print uniqueness
4. Multiple Regression for identifying the significant lip print uniqueness awareness factors and the factors for pros and cons of using lip print uniqueness

Tools for presentation

The following tools for presentation of data were used

1. Univariate tables,
2. Bi variate tables, and

3. Bar charts
 Analysis and interpretation
 Opinion about uniqueness of lip print

Table 2: Opinion about uniqueness of lip print

Opinion	Frequency	Percentage
Disagree	8	5.3
Neither agree nor disagree	119	79.3
Agree	20	13.3
Strongly agree	3	2.0
Total	150	100.0

Out of 150 respondents, the majority (79.3%, or 119 individuals) neither agree nor disagree regarding the uniqueness of lip prints, indicating a general lack of strong opinion or awareness on the subject. 13.3% (20 respondents) agree that lip prints are unique, while only 2% (3 respondents) strongly agree. A small percentage, 5.3% (8 respondents), disagree with the uniqueness of lip prints. Overall, the data suggests that most respondents are neutral or uncertain about the uniqueness of lip prints, with only a minority expressing clear agreement or disagreement. There is no significant association between opinion among respondents about the uniqueness of lip prints and their gender, age, marital status, educational qualification at 5% level. There is significant association between opinion among respondents about the uniqueness of lip prints and family income at 5% level.

Statements describing uniqueness of lip prints

Thirteen statements describing the uniqueness of lip prints were identified and their mean agreement score was computed along with their standard deviation and is presented below.

Table 3: Descriptive statistics for the statements describing uniqueness of lip prints

Statements	Mean	Std. Deviation
Study of lip prints is Cheiloscopy	3.1133	.51209
Lip print patterns differ from gender to gender	3.1667	.52350
Upper lip pattern do not coincide with lower lip patterns	3.1267	.64814
Vertical wrinkles covering the whole lip do not match with any other patterns	3.1267	.54707
Straight Branch wrinkles are unique	3.0533	.62161
Crossed Branch grooves of a person is distinct	2.9667	.60664
Recticular pattern grooves differentiate one from another	3.0000	.62391
Lip colour differs	2.8267	.91039
Colour of lip changes due to smoking	3.0667	1.09708
Some grooves do not come under any pattern	3.0000	.49154
Identical twins have same pattern of lip prints	3.1576	.56064
Lip print helps to identify ethnic similarities	3.0933	.61684
Lip prints do not change throughout life	3.1600	.81989

The highest agreement is for the statement 'Lip print patterns differ from gender to gender' with a mean of 3.1667 and lowest agreement is for the statement 'Lip colour differs' with a mean of 2.8267.

The highest variation in the opinion is for the statement 'Colour of lip changes due to smoking' with a standard deviation of 1.09708 and the lowest variation in the opinion is for the statement 'Some grooves do not come under any pattern' with a standard deviation of .49154.

Factor analysis of Statements describing uniqueness of lip prints

The thirteen statements describing the uniqueness were subjected to factor analysis and the rotated component matrix is presented below.

Table 4: Rotated component matrix for the statements describing uniqueness of lip prints

Statement	Factor Component					
	1	2	3	4	5	6
Identical twins have same pattern of lip prints	.768	-.051	.071	.214	.164	.194
Recticular pattern grooves differentiate one from another	.740	.088	-.127	-.075	-.204	-.102
Some grooves do not come under any pattern	-.090	.756	.066	-.050	.055	.147
Lip print helps to identify ethnic similarities	.112	.657	.132	-.010	.035	-.102

Color of lip changes due to smoking	-.082	.147	.766	-.106	-.029	-.050
Lip print patterns differ from gender to gender	.026	.182	.573	.377	-.230	.101
Crossed Branch grooves of a person is distinct	.079	-.029	-.074	.642	-.062	.047
Vertical wrinkles covering the whole lip do not match with any other patterns	-.007	-.053	.091	.630	.054	-.243
Lip prints do not change throughout life	.065	-.045	-.062	-.226	.696	-.101
Lip colour differs	-.144	.288	-.092	.238	.634	-.035
Upper lip pattern do not coincide with lower lip patterns	.119	.020	.021	-.218	-.102	.749
Study of lip prints is Cheiloscopy	.318	-.152	.400	-.293	.133	-.478
Straight Branch wrinkles are unique	-.034	-.344	.378	.056	.407	.428
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.^a						
a. Rotation converged in 12 iterations.						

The six factor components extracted were named as follows based on factor loadings

1. Identical twins lips differ and reticular patterns vary,
2. Some grooves do not follow pattern and lip patterns help identify ethnic people,
3. Lip colour changes due to smoking,
4. Crossed branched grooves and vertical patterns are unique,
5. Lip prints do not change but lip colour changes in a person's life, and
6. Upper lip patterns do not coincide with lower lip patterns.

Multiple linear regression to estimate level of agreement towards uniqueness if lip print and the factors extracted from statements describing uniqueness of lip prints

Multiple linear regression to estimate level of agreement towards uniqueness if lip print and the factors extracted from statements describing uniqueness of lip prints

A multiple linear regression was conducted to examine the predictors of the opinion about the uniqueness of lip prints. The overall regression model was statistically significant, and individual coefficients are reported in the table below.

Table 5: Multiple linear regression to estimate level of agreement towards uniqueness if lip print and the factors extracted from statements describing uniqueness of lip prints

Factor component	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.120	.040		77.301	.000
Identical twins lips differ and reticular patterns vary	.003	.040	.007	.085	.933
Some grooves do not follow pattern and lip patterns help identify ethnic people	-.052	.040	-.104	-1.293	.198
Lip colour changes due to smoking	-.050	.040	-.099	-1.232	.220
Crossed branched grooves and vertical patterns are unique	.016	.040	.032	.396	.692
Lip prints do not change but lip colour changes in a persons life	.109	.040	.216	2.684	.008*
Upper lip patterns do not coincide with lower lip patterns	.046	.040	.091	1.138	.257
a. Dependent Variable: State your opinion about uniqueness if lip print					
* Significant					

Only the predictor "Lip prints do not change but lip colour changes in a person's life" significantly predicted the level of agreement towards uniqueness of lip print ($p = .008$).

Opinion about awareness of pros and cons of using lip prints**Table 6: Opinion about awareness of pros and cons of using lip prints**

Opinion	Frequency	Percentage
Strongly disagree	4	2.7
Disagree	10	6.7
Neither agree nor disagree	93	62.0
Agree	32	21.3
Strongly agree	11	7.3
Total	150	100.0

The majority of respondents (62.0%) chose "Neither agree nor disagree", indicating a neutral stance on the opinion presented. A combined 28.6% of participants (21.3% "Agree" and 7.3% "Strongly agree") expressed a positive agreement, while only 9.4% (6.7% "Disagree" and 2.7% "Strongly disagree") expressed disagreement. This suggests that while a small portion of respondents disagreed, there is a moderate level of agreement, and a significant number remain undecided or indifferent on the issue. There is no significant association between opinion among respondents about the pros and cons of using lip prints for personal identification and their gender, marital status, educational qualification and family income at 5% level. There is significant association between opinion among respondents about the pros and cons of using lip prints for personal identification and their age at 5% level.

Awareness towards various lip print applications

Thirteen statements describing awareness towards various lip print applications were identified and their mean agreement score was computed along with their standard deviation and is presented below.

Table 7: Descriptive statistics for the statements describing awareness towards various lip print applications

Statements	Mean	Std. Deviation
Lip prints can be used for attendance	2.9800	.83922
Lip prints attendance avoids spreading of infections due to finger print biometrics	3.3533	1.15936
Criminal profiling identification can be done	3.3533	1.07527
Lip prints are used for medical identity	3.3867	1.06681
Ease of identification Operation	3.4067	1.05612
Psychological uniqueness can be revealed	3.0667	.78293
Personality uniqueness can be found	3.1667	.52350
Dual Identification UID is possible	3.1200	.68463
Advertisements using lip prints is possible	3.1667	.69915
Lip prints provide collaborative identity with finger prints	3.2133	.66137
Lip prints are related to one's IQ	3.0267	.59015
Lip prints are related to one's EQ	3.0600	.62638
Collecting high quality lip print from a crime scene is challenging	3.2733	.94760

The highest variation in the opinion is for the statement 'Lip prints attendance avoids spreading of infections due to finger print biometrics' with a standard deviation of 1.15936 and the lowest variation in the opinion is for the statement 'Personality uniqueness can be found' with a standard deviation of .52350.

Factor analysis of the statements describing awareness towards various lip print applications.

Table 8: Rotated component matrix for the statements describing awareness towards various lip print applications

Statement	Factor Component					
	1	2	3	4	5	6
Collecting high quality lip print from a crime scene is challenging	.675	-.150	.073	.091	.119	.045
Psychological uniqueness can be revealed	-.610	.024	.087	.160	.099	-.064
Lip prints are related to one's EQ	-.591	-.215	-.007	-.219	-.169	.056
Criminal profiling identification can be done	-.071	.767	.076	.132	.025	-.104
Lip prints are used for medical identity	.093	.552	-.223	-.327	.101	.167

Lip prints are related to one's IQ	.178	.045	-.830	.062	-.200	.013
Dual Identification UID is possible	.372	.342	.558	-.133	-.271	-.078
Lip prints can be used for attendance	.139	-.229	.471	.359	-.161	.164
Ease of identification Operation	.056	-.046	-.028	.773	-.065	-.048
Lip prints provide collaborative identity with finger prints	-.018	.368	-.044	.503	.367	.106
Advertisements using lip prints is possible	.109	.081	.048	-.030	.832	.005
Personality uniqueness can be found	.130	-.152	-.078	-.195	.245	.776
Lip prints attendance avoids spreading of infections due to finger print biometrics	-.080	.183	.138	.263	-.333	.680
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.^a						
a. Rotation converged in 16 iterations.						

Based on factor loadings the six factor components extracted were named as follows:

1. Collecting lip print challenging and failure of lip prints revealing one's Psychology
2. Criminal profiling possibilities
3. Lip prints not related to one's IQ
4. Ease of identification
5. Use of lip prints in Advertisements
6. Finding personality uniqueness

Multiple linear regression to estimate opinion about awareness of pros and cons of using lip prints and the factors extracted from statements describing awareness towards various lip print applications.

Table 9: Multiple linear regression to estimate opinion about awareness of pros and cons of using lip prints and the factors extracted from statements describing awareness towards various lip print applications

Factor component	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.240	.063		51.449	.000
Collecting lip print challenging and failure of lip prints revealing one's Psychology	-.054	.063	-.068	-.852	.396
Criminal profiling possibilities	.164	.063	.207	2.599	.010
Lip prints not related to one's IQ	.043	.063	.054	.679	.498
Ease of identification	.021	.063	.026	.329	.742
Use of lip prints in Advertisements	.105	.063	.133	1.668	.097
Finding personality uniqueness	.111	.063	.141	1.764	.080
a. Dependent Variable: State your opinion about uniqueness if lip print					
* Significant					

Among all predictors, "Criminal profiling possibilities" is the only statistically significant predictor ($p = .010$), indicating that beliefs about lip prints aiding criminal profiling positively influence the dependent variable. Other factors, while some show mild trends (e.g., personality uniqueness and advertisements), are not statistically significant.

Table 10: Classification of respondents based on Afchar-Bayat upper lip quadrant 1

Afchar-Bayat Upper lip quadrant 1	Frequency	Percent
Vertical and straight grooves, covering the whole lip	58	38.7
Like the former, but not covering the whole lip	20	13.3

Straight branched grooves	51	34.0
Angulated branched grooves	5	3.3
Converging the lip	9	6.0
Reticular pattern grooves	4	2.7
Other grooves	3	2.0
Total	150	100.0

The distribution shows that over 85% of individuals exhibit one of the three main groove types: vertical and straight grooves (full or partial) and straight branched grooves. This concentration suggests these patterns are characteristic of the population studied and could potentially serve as markers in forensic or anthropological identification, assuming the patterns are unique and stable. The rarer patterns (e.g., angulated, converging, reticular, and "other") make up a small percentage, collectively about 14%. These may be of particular interest in distinguishing individuals with less common features.

Chi square analysis showed that there is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 1 at 5% level.

Afchar-Bayat upper lip quadrant 2

Table 11: Classification of respondents based on Afchar-Bayat upper lip quadrant 2

Afchar-Bayat Upper lip quadrant 2	Frequency	Percent
Vertical and straight grooves, covering the whole lip	25	16.7
Like the former, but not covering the whole lip	16	10.7
Straight branched grooves	27	18.0
Angulated branched grooves	23	15.3
Converging the lip	20	13.3
Reticular pattern grooves	35	23.3
Other grooves	4	2.7
Total	150	100.0

Shows that Quadrant 2 features greater diversity and a more even distribution across groove types compared to Quadrant 1. Reticular and branched grooves play a more prominent role, potentially pointing to structural or developmental differences. This could be relevant in fields such as forensic science, genetic studies, or anthropological research, where lip patterns are used as biometric markers.

Chi-square analysis shows that the Four of the five demographic variables (gender, age, education, marital status) do not show significant association with classification of respondents based on Afchar-Bayat upper lip quadrant 2 at 5% level.

Afchar-Bayat upper lip quadrant 3

Table 12: Classification of respondents based on Afchar-Bayat upper lip quadrant 3

Afchar-Bayat Upper lip quadrant 3	Frequency	Percent
Vertical and straight grooves, covering the whole lip	28	18.7
Like the former, but not covering the whole lip	32	21.3
Straight branched grooves	26	17.3
Angulated branched grooves	7	4.7
Converging the lip	26	17.3
Reticular pattern grooves	29	19.3
Other grooves	1	.7
Total	150	100.0

1. Most Common Patterns:

- o Like the former, but not covering the whole lip (i.e., vertical and straight grooves partially covering the lip) is the most frequent pattern, seen in 21.3% of individuals.
- o Reticular pattern grooves follow closely at 19.3%.
- o Vertical and straight grooves, covering the whole lip are next at 18.7%.
These three patterns collectively account for nearly 60% of the total sample, indicating that they are the dominant groove types in this population.

2. Moderately Common Patterns:

- o Straight branched grooves and converging the lip patterns are both observed in 17.3% of individuals. These also represent a significant portion of the sample and suggest a diverse expression of lip groove types.

3. Less Common Patterns:

- o Angulated branched grooves are found in only 4.7% of the individuals, indicating it is relatively rare.
- o Other grooves appear in just 0.7%, representing unique or atypical groove formations.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 3 at 5% level.

Afchar-Bayat upper lip quadrant 4**Table 13: Classification of respondents based on Afchar-Bayat upper lip quadrant 4**

Afchar-Bayat Upper lip quadrant 4	Frequency	Percent
Vertical and straight grooves, covering the whole lip	45	30.0
Like the former, but not covering the whole lip	38	25.3
Straight branched grooves	37	24.7
Angulated branched grooves	7	4.7
Converging the lip	12	8.0
Reticular pattern grooves	10	6.7
Other grooves	1	.7
Total	150	100.0

Vertical and straight grooves, covering the whole lip (30.0%). This is the most common pattern. Suggests a dominant or typical lip groove feature in the studied population. Like the former, but not covering the whole lip (25.3%) The second most frequent. Similar to the most common pattern but less pronounced. Straight branched grooves (24.7%). Very close in frequency to the second type. These may indicate a genetic variation where primary grooves develop minor offshoots. Angulated branched grooves (4.7%). Less common. The angles and branches might suggest a higher variability or complexity in lip groove formation. Converging grooves (8.0%). Grooves appear to come together towards a central point. May indicate a distinctive trait in a subset of the population. Reticular pattern grooves (6.7%). These are net-like or crisscrossing grooves. Significantly less common. Other grooves (0.7%). Very rare or unique patterns not fitting standard categories. May be anomalies or individual-specific features.

The majority (80%) of the sample falls into the top three categories (vertical full, partial, and straight branched), indicating these are the predominant lip print patterns in the studied group. The rarer patterns (reticular, angulated, converging) collectively account for a smaller portion (about 20%), highlighting diversity within a smaller subset.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 4 at 5% level.

As done for upper lip four quadrants it is also verified with the data received for all four lower lip quadrants.

Afchar-Bayat lower lip quadrant 1

Straight Branched Grooves (39.3%) – Most Common Pattern Indicates a strong prevalence of this structure in the sample. Vertical and Straight Grooves, Covering the Whole Lip (26.7%) Indicates a significant portion of the population has well-defined, uninterrupted groove patterns. Converging Grooves (14.7%) Could be indicative of region-specific or family-specific traits. Angulated Branched Grooves (10.7%) These patterns are less common and might be considered unique identifiers in forensic contexts. Partial Vertical Grooves (7.3%) Could indicate wear, environmental impact, or a weaker genetic trait. Reticular and Other Grooves (Each 0.7%) – Rarest Patterns Extremely uncommon. “Other” includes patterns that do not fit traditional classifications — possibly anomalies or unique variants.

The majority (66%) of the population displays either straight branched or fully vertical grooves, highlighting these as dominant or typical lower lip features. Converging and angulated patterns are present in a moderate segment (25.4%), suggesting some diversity.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 1 at 5% level.

Afchar-Bayat lower lip quadrant 2

Vertical and Straight Grooves, Covering the Whole Lip (41.3%) – Most Common Pattern This is the dominant pattern, seen in over two-fifths of the sample. Often considered a stable and identifiable trait, useful in forensic and biometric studies. Reticular Pattern Grooves (14.7%) The second most frequent pattern, characterized by a net-like or webbed appearance.

Its relatively high frequency suggests a notable variation in this sample. Like the Former, But Not Covering the Whole Lip (13.3%). Straight Branched Grooves (11.3%). Angulated Branched Grooves (10.7%). Less common but still present in a significant minority. Converging the Lip (6.7%). Lower in frequency, possibly regionally or individually specific.

Other Grooves (2.0%). These may include unclassified or rare patterns, suggesting individual uniqueness or anomalies. A majority of individuals (54.6%) exhibit either fully or partially vertical grooves, indicating a tendency toward simpler, linear groove patterns in this population. However, a significant portion (approx. 36.7%) shows branched, reticular, or complex patterns, reflecting morphological variation.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 2 at 5% level.

Afchar-Bayat lower lip quadrant 3

Vertical and Straight Grooves, Covering the Whole Lip formed 32.7%, Reticular Pattern Grooves formed 24.7% The second most common pattern, Like the Former, But Not Covering the Whole Lip formed 16.7%, Converging the Lip formed 8.7%, Angulated Branched Grooves 8.0%) Straight Branched Grooves formed 7.3%, and Other Grooves formed 2.0%.

Vertical grooves (fully and partially) account for 49.4%, suggesting a strong trend toward simple linear patterns in the lower lip. Reticular grooves (24.7%) are notably more frequent than in many populations, indicating a significant presence of complex morphological traits. The remaining patterns show moderate variability, pointing to a diverse range of lip print structures within the sample.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 3 at 5% level.

Afchar-Bayat lower lip quadrant 4

Straight Branched Grooves (38.7%) – Most Common Pattern. This is the dominant pattern, seen in nearly 4 out of 10 individuals. Vertical and Straight Grooves, Covering the Whole Lip (24.7%) The second most frequent pattern. Converging the Lip (12.0%) A moderate frequency suggests it's a noteworthy minority pattern. Like the Former, But Not Covering the Whole Lip formed 10.7%. Angulated Branched Grooves (8.7%) Less common, but still present in a notable portion of the population. Reticular Pattern Grooves (0.7%) – Rare. Other Grooves formed 4.7%. The majority (63.4%) of participants have either straight branched or vertical groove types, pointing to a dominance of structured groove patterns. The reticular pattern is almost absent, contrasting with populations where it's more prominent. A variety of groove types are represented, indicating morphological diversity in this population.

There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 4 at 5% level.

Lip prints individual characteristics Kasprzak lip classification for upper lip quadrants

The table below presents a detailed breakdown of individual lip print characteristics across all four quadrants of the upper lip (Quadrant 1 to Quadrant 4), each with 150 observations. Both frequency and percentage are provided for each characteristic in each quadrant.

Table 14: Lip prints individual characteristics Kasprzak lip classification for upper lip quadrants

Lip prints individual characteristics	Upper lip quadrant 1		Upper lip quadrant 2		Upper lip quadrant 3		Upper lip quadrant 4	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1. An eye	7	4.7	9	6.0	14	9.3	6	4.0
2. A hook	28	18.7	8	5.3	10	6.7	9	6.0
3. A bridge	14	9.3	13	8.7	17	11.3	8	5.3
4. A line	14	9.3	7	4.7	8	5.3	15	10.0
5. A dot	3	2.0	4	2.7	6	4.0	8	5.3
6. A rectangle like	10	6.7	16	10.7	16	10.7	12	8.0
7. A triangle like	8	5.3	12	8.0	9	6.0	8	5.3
8. A group of dots	5	3.3	7	4.7	12	8.0	5	3.3
9. A simple top furcation	7	4.7	6	4.0	5	3.3	7	4.7
10. A simple bottom furcation	6	4.0	8	5.3	6	4.0	12	8.0
11. A double eye	3	2.0	7	4.7	3	2.0	5	3.3
12. Hexagonal arrangement	4	2.7	7	4.7	1	.7	3	2.0
13. Crossing lines	9	6.0	15	10.0	5	3.3	12	8.0
14. A closing bottom furcation	9	6.0	3	2.0	4	2.7	10	6.7
15. A delta like opening	0	0.0	6	4.0	4	2.7	3	2.0
16. A simple opening	2	1.3	3	2.0	4	2.7	4	2.7
17. A closing top bifurcation	7	4.7	2	1.3	2	1.3	12	8.0
18. A pentagonal arrangement	1	.7	2	1.3	5	3.3	5	3.3
19. A branch like top bifurcation	4	2.7	4	2.7	3	2.0	1	.7
20. A fence	2	1.3	2	1.3	5	3.3	0	0.0
21. A branch like bottom bifurcation	6	4.0	2	1.3	5	3.3	4	2.7

22. Double fence	1	.7	7	4.7	6	4.0	1	.7
Total	150	100.0	150	100.0	150	100.0	150	100.0

Most Common Features (by total frequency and presence across quadrants):

- A hook stands out in Quadrant 1 (18.7%)—the most dominant feature in any single quadrant.
- A bridge is relatively frequent across all quadrants (8.7% to 11.3%), especially in Q3 (11.3%).
- A rectangle like is also consistently common (6.7%–10.7%), peaking in Q2 and Q3 (10.7% each).
- Crossing lines are prominent in Q2 (10.0%) and Q4 (8.0%).
- A line is notably frequent in Q4 (10.0%) and Q1 (9.3%).

1. Quadrant-Wise Observations:

Quadrant 1 (Q1):

- Dominated by "A hook" (18.7%).
- Also features strong presence of "A bridge" (9.3%), "A line" (9.3%), and "Crossing lines" (6.0%).
- Unique observation: "A delta like opening" is absent (0.0%), indicating asymmetry.

Quadrant 2 (Q2):

- More diverse in distribution.
- Top characteristics include:
 - "A rectangle like" (10.7%)
 - "Crossing lines" (10.0%)
 - "A triangle like" (8.0%)
 - "A bridge" (8.7%)
- Many characteristics hover around 4–8%, suggesting no single dominant trait like in Q1.

Quadrant 3 (Q3):

- "A bridge" is highest (11.3%), suggesting significance in this quadrant.
- High presence of "A rectangle like" (10.7%) and "Group of dots" (8.0%).
- Lower frequencies of more complex patterns (e.g., "Hexagonal arrangement" is only 0.7%).

Quadrant 4 (Q4):

- Strong features include:
 - "A line" (10.0%)
 - "A rectangle like" (8.0%)
 - "A simple bottom bifurcation" (8.0%)
 - "A closing top bifurcation" (8.0%)
 - "Crossing lines" (8.0%)
- Greater concentration of mid-frequency traits, suggesting a balanced mix.

2. Rare/Low-Frequency Characteristics:

- Characteristics with <2% in most or all quadrants:
 - "A pentagonal arrangement"
 - "A fence"
 - "Double fence"
 - "A delta like opening" (especially absent in Q1)
 - "A branch like top/bottom bifurcation"

These may serve as differentiators or individual identifiers due to their rarity.

Key Insights:

1. Quadrant 1 shows dominance of specific patterns like "A hook", unlike the other quadrants.
2. Quadrant 2 and 4 show pattern variety, with a relatively even spread of characteristics.
3. Symmetry is not strongly evident; many characteristics vary between left and right quadrants (e.g., Q1 vs Q2).
4. Lip print analysis could potentially focus on quadrant-level detail for forensic or biometric applications, as distribution is non-uniform.

Lip prints individual characteristics Kasprzak lip classification for lower lip quadrants

The table below presents a detailed breakdown of individual lip print characteristics across all four quadrants of the lower lip (Quadrant 1 to Quadrant 4), each with 150 observations. Both frequency and percentage are provided for each characteristic in each quadrant.

Table 15: Lip prints individual characteristics Kasprzak lip classification for lower lip quadrants

Lip prints individual characteristics	Lower lip quadrant 1		Lower lip quadrant 2		Lower lip quadrant 3		Lower lip quadrant 4	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
1. An eye	10	6.7	7	4.7	12	8.0	14	9.3
2. A hook	9	6.0	9	6.0	6	4.0	9	6.0

3.	A bridge	8	5.3	10	6.7	6	4.0	6	4.0
4.	A line	2	1.3	5	3.3	3	2.0	7	4.7
5.	A dot	2	1.3	9	6.0	8	5.3	5	3.3
6.	A rectangle like	13	8.7	15	10.0	9	6.0	9	6.0
7.	A triangle like	8	5.3	8	5.3	13	8.7	9	6.0
8.	A group of dots	3	2.0	5	3.3	11	7.3	11	7.3
9.	A simple top furcation	7	4.7	3	2.0	5	3.3	2	1.3
10.	A simple bottom furcation	15	10.0	0	0.0	4	2.7	16	10.7
11.	A double eye	4	2.7	10	6.7	7	4.7	3	2.0
12.	Hexagonal arrangement	7	4.7	2	1.3	8	5.3	6	4.0
13.	Crossing lines	12	8.0	8	5.3	9	6.0	11	7.3
14.	A closing bottom furcation	6	4.0	7	4.7	3	2.0	7	4.7
15.	A delta like opening	1	.7	8	5.3	5	3.3	3	2.0
16.	A simple opening	3	2.0	8	5.3	5	3.3	1	.7
17.	A closing top bifurcation	8	5.3	5	3.3	3	2.0	3	2.0
18.	A pentagonal arrangement	9	6.0	3	2.0	6	4.0	6	4.0
19.	A branch like top bifurcation	6	4.0	2	1.3	4	2.7	6	4.0
20.	A fence	2	1.3	8	5.3	3	2.0	2	1.3
21.	A branch like bottom bifurcation	15	10.0	7	4.7	7	4.7	10	6.7
22.	Double fence	0	0.0	11	7.3	13	8.7	4	2.7
Total		150	100.0	150	100.0	150	100.0	150	100.0

Most Common Features (Across All Quadrants):

- "A rectangle like" pattern is highly frequent, especially in Q2 (10.0%) and Q1 (8.7%).
- "A simple bottom furcation" is very common in Q1 (10.0%) and Q4 (10.7%).
- "A branch like bottom bifurcation" appears strongly in Q1 (10.0%) and Q4 (6.7%).
- "Double fence" is rare in Q1 (0.0%) but relatively high in Q2 (7.3%) and Q3 (8.7%).
- "Crossing lines" are consistently frequent (5.3% to 8.0%) across all quadrants.

1. Quadrant-Wise Observations:

Lower Lip Quadrant 1 (Q1):

- Top patterns:
 - o Simple bottom furcation (10.0%)
 - o Branch like bottom bifurcation (10.0%)
 - o Rectangle like (8.7%)
 - o Crossing lines (8.0%)
- Low occurrences:
 - o Delta like opening (0.7%)
 - o Fence and Dot (1.3% each)
 - o Double fence (0.0%)

Interpretation: Q1 shows strong tendencies toward bottom bifurcation and structured patterns like rectangle and crossing lines.

Lower Lip Quadrant 2 (Q2):

- Top patterns:
 - o Rectangle like (10.0%)
 - o Double eye (6.7%)
 - o Dot and Branch like bottom bifurcation (6.0% each)
 - Simple bottom furcation is completely absent (0.0%)
 - Delta like opening, Simple opening, and Fence are moderately present (5.3% each)
- Interpretation: Q2 features more dot and double eye patterns, with relatively high variability.

Lower Lip Quadrant 3 (Q3):

- Top patterns:
 - o Triangle like (8.7%)
 - o Double fence (8.7%)
 - o Group of dots (7.3%)
- Bridge, Hook, and Simple bottom furcation are lower (4.0% or less)

Interpretation: Q3 emphasizes geometric and group patterns (e.g., triangle, group of dots), suggesting a diverse visual print.

Lower Lip Quadrant 4 (Q4):

- Top patterns:
 - o Simple bottom furcation (10.7%) — highest in this quadrant
 - o Group of dots and Crossing lines (7.3%)
 - o An eye (9.3%) — highest of this type across all quadrants

Interpretation: Q4 leans toward bottom furcation and eye/group-based patterns, making it a highly textured quadrant.

2. Rare or Asymmetrical Features:

- Double fence:
 - o Not present in Q1 (0.0%), but high in Q2 & Q3.
- Fence: Appears mostly in Q2 (5.3%) and rarely in others.
- Delta like opening: Absent or low (0.7%–5.3%)
- Simple opening: Generally low (0.7%–5.3%)
- An eye is notably high in Q4 (9.3%) compared to Q2 (4.7%)

Key Takeaways:

1. No single feature dominates across all quadrants, supporting the uniqueness of each lip print region.
2. Some characteristics are quadrant-specific, e.g.:
 - o Simple bottom furcation is absent in Q2 but dominant in Q1 and Q4.
 - o Double fence is common in Q2 & Q3, absent in Q1.
3. Lower lip prints show richer structural variety in features like furcations, fences, and group arrangements than upper lip prints.
4. Patterns are not symmetrically distributed, reinforcing the biometric potential of quadrant-level lip print analysis.

LIP PRINT UNIQUENESS VERIFIED USING THE DATA RECEIVED QUADRANT-WISE:

The data received from the lips of the respondents are tabulated quadrant-wise from upper lips quadrant 1 to quadrant 4 and from lower lips quadrant 1 to quadrant 4. Using the data received from each quadrants of upper and lower lips, each row was compared manually say for example, taking first column choosing value 1 and comparing the second column for uniqueness. If any column matches then third column is compared similarly till 8th column. This procedure is done for value 2 of first column and so on till the value is 22. This procedure was done and found that all rows differ from each other. By this we can establish the fact that the lip prints of all the received 150 samples are unique.

FINDINGS

1. Out of 150 respondents, the majority (79.3%, or 119 individuals) neither agree nor disagree regarding the uniqueness of lip prints, indicating a general lack of strong opinion or awareness on the subject. Overall, the data suggests that most respondents are neutral or uncertain about the uniqueness of lip prints, with only a minority expressing clear agreement or disagreement.
2. There is no significant association between opinion among respondents about the uniqueness of lip prints and their gender, age, marital status, educational qualification at 5% level. There is significant association between opinion among respondents about the uniqueness of lip prints and family income at 5% level.
3. The highest agreement is for the statement 'Lip print patterns differ from gender to gender' with a mean of 3.1667 and lowest agreement is for the statement 'Lip colour differs' with a mean of 2.8267. The highest variation in the opinion is for the statement 'Colour of lip changes due to smoking' with a standard deviation of 1.09708 and the lowest variation in the opinion is for the statement 'Some grooves do not come under any pattern' with a standard deviation of .49154.
4. The six factor components extracted from statements describing the uniqueness of lip prints were named as follows based on factor loadings
 - Identical twins lips differ and reticular patterns vary,
 - Some grooves do not follow pattern and lip patterns help identify ethnic people,
 - Lip colour changes due to smoking,
 - Crossed branched grooves and vertical patterns are unique,
 - Lip prints do not change but lip colour changes in a person's life, and
 - Upper lip patterns do not coincide with lower lip patterns.
5. Only the predictor "Lip prints do not change but lip colour changes in a person's life" significantly predicted the level of agreement towards uniqueness of lip print ($p = .008$).
6. The majority of respondents (62.0%) chose "Neither agree nor disagree", indicating a neutral stance on the opinion presented. This suggests that while a small portion of respondents disagreed, there is a moderate level of agreement, and a significant number remain undecided or indifferent on the issue.
7. There is no significant association between opinion among respondents about the pros and cons of using lip prints for personal identification and their gender, marital status, educational qualification and family income at 5% level.
8. There is significant association between opinion among respondents about the pros and cons of using lip prints for personal identification and their age at 5% level.
9. The highest variation in the opinion is for the statement 'Lip prints attendance avoids spreading of infections due to finger print biometrics' with a standard deviation of 1.15936 and the lowest variation in the opinion is for the statement 'Personality uniqueness can be found' with a standard deviation of .52350.
10. The six factor components extracted from statements describing opinion among respondents about the pros and cons of using lip prints for personal identification were named as follows:

- Collecting lip print challenging and failure of lip prints revealing one's Psychology
 - Criminal profiling possibilities
 - Lip prints not related to one's IQ
 - Ease of identification
 - Use of lip prints in Advertisements
 - Finding personality uniqueness
11. Among all predictors, "Criminal profiling possibilities" is the only statistically significant predictor ($p = .010$), indicating that beliefs about lip prints aiding criminal profiling positively influence the dependent variable. Other factors, while some show mild trends (e.g., personality uniqueness and advertisements), are not statistically significant.
 12. Chi square analysis showed that there is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 1 at 5% level.
 13. Chi-square analysis shows that the Four of the five demographic variables (gender, age, education, marital status) do not show significant association with classification of respondents based on Afchar-Bayat upper lip quadrant 2 at 5% level.
 14. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 1 at 5% level.
 15. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 2 at 5% level.
 16. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 3 at 5% level.
 17. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat upper lip quadrant 4 at 5% level.
 18. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 1 at 5% level.
 19. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 2 at 5% level.
 20. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 3 at 5% level.
 21. There is no significant association between a respondent's gender, age, education, family income and marital status and classification of respondents based on Afchar-Bayat lower lip quadrant 4 at 5% level.
 22. With regard to Lip prints individual characteristics Kasprzak lip classification for upper lip quadrants, Quadrant 1 shows dominance of specific patterns like "A hook", unlike the other quadrants, Quadrant 2 and 4 show pattern variety, with a relatively even spread of characteristics, Symmetry is not strongly evident; many characteristics vary between left and right quadrants (e.g., Q1 vs Q2), Lip print analysis could potentially focus on quadrant-level detail for forensic or biometric applications, as distribution is non-uniform.
 23. With regard to Lip prints individual characteristics Kasprzak lip classification for upper lip quadrants, no single feature dominates across all quadrants, supporting the uniqueness of each lip print region. Some characteristics are quadrant-specific, e.g.: Simple bottom furcation is absent in Q2 but dominant in Q1 and Q4. Double fence is common in Q2 & Q3, absent in Q1. Lower lip prints show richer structural variety in features like furcations, fences, and group arrangements than upper lip prints. Patterns are not symmetrically distributed, reinforcing the biometric potential of quadrant-level lip print analysis.

CONCLUSION

It is established that gender, age, marital status, educational qualification and family income do not have significant association between opinion among respondents about uniqueness of lip prints. Also it is established that gender, age, marital status, educational qualification and family income do not have significant association between opinion among respondents about pros and cons of lip prints.

Since majority (79.3% or 119 individuals) neither agree nor disagree regarding the uniqueness of lip prints, indicating the general lack of strong opinion or awareness on the subject, overall data suggested that respondents are neutral or uncertain about the uniqueness of lip prints. Out of the six factor components extracted from the statements describing the uniqueness of lip prints, only the predictors "Lip prints do not change but lip color change in a person's life" significantly predicted the level of agreement towards uniqueness of lip print ($p=0.008$). Also Out of the six factor components extracted from the statements describing opinion about pros and cons of using lip prints for personal identification, "criminal profiling possibilities" is the only statistically significant predictor ($p=0.010$) indicating that beliefs about lip prints aiding criminal profiling positively influence the dependent variable.

Also analysis using Kasprzak lip classification, it is found that lip print patterns are not symmetrically distributed, reinforcing the biometric potential of quadrant level lip print analysis. Also no single feature dominates across all quadrants supporting the uniqueness of each lip print region. Since manual comparison of all collected samples also do not match with each other the fact that lip prints are unique is also verified.

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