

## Cheiloscopy Pattern And Its Relation With Dental Caries And The Permanent Molar Relationship Among Dental Students - A Cross Sectional Study

Research Article

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### Abstract

**Introduction:** Dental caries and malocclusion are the most common oral health problems faced by mankind. Oral health problems can be partly explained by the fact that these diseases are genetically linked. It is a known fact that the epithelium of lips and tooth develop at the same time of intrauterine life. So our study was an attempt to correlate the occurrence of dental caries and angle's molar relationship status in an individual with their lip patterns.

**Materials and Methods:** A cross-sectional study was carried out on 60 dental students of Tamilnadu and Andhra pradesh, age range of 18-30 years. The lip pattern was recorded and classified by Suzuki and Tsuchihashi, dental caries was interpreted based on decayed, missing, and filled teeth (DMFT) index and molar relation was assessed using Angle's molar classification was used. The obtained data were subjected to statistical analysis using Chi-square test.

**Results:** 62.5 % of the study participants who are of Tamilnadu origin had type II lip pattern. 58.33% of the study participants who belonged to Andhra pradesh had type II lip pattern. There was a significant association between lip pattern and DMFT index group, wherein students with DMFT score below 3 had type II lip pattern. Participants with type II lip pattern were significantly associated with Angle's class I molar relationship.

**Conclusion:** Type II lip pattern was a predictive indicator for dental caries and Angle's molar relationship status, which had less caries experience and Class I angle's molar relationship respectively.

**Keywords:** Cheiloscopy; Lip Pattern; Dental Caries; Malocclusion.

### Introduction

The labial mucosa forms a characteristic pattern of skin creases and grooves called lip prints. The study of lip prints is known as cheiloscopy [1]. Cheiloscopy was first described by R.Fischer in 1902. In the period 1968-1971 two Japanese scientists, Y.Tsuchihashi and T.Suzuki examined 1364 persons and proved that the arrangement of furrows on the lips can be used for identification of a person as it is unique for each human being [2]. Lip prints are the same throughout the lifespan of the individual and recover to original pattern after any deformities hence it adds to the forensic value and is used as a tool for human identification

[3].

The impact of oral health on one's quality of life is termed as oral health related quality of life. This oral health related quality of life is associated with two important diseases: dental caries and malocclusion [5]. Dental caries is a multifactorial disease which is a common problem for mankind [6]. Malocclusion is one of the major oral health problems ranking number three after dental caries and periodontal disease. Malocclusion is the deviation from normal occlusion, which results in misalignment of teeth and produces detrimental effects on overall esthetics and decreases a person's self-esteem [7]. Malocclusion is influenced mostly by the genetic and environmental factors. There are various treatments

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**Received:** April 20, 2021**Accepted:** July 09, 2021**Published:** July 19, 2021

**Citation:** Sarika Balaganesh, L. Leelavathi, Meignana Arumugham Indiran. Cheiloscopy Pattern And Its Relation With Dental Caries And The Permanent Molar Relationship Among Dental Students - A Cross Sectional Study. *Int J Dentistry Oral Sci.* 2021;8(7):3419-3423. doi: <http://dx.doi.org/10.19070/2377-8075-21000695>

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and preventive measures to treat dental caries and malocclusion, but there can be an alternate solution to these oral conditions which is the prediction with respect to lip pattern. It is known that the development of facial skeleton particularly the lips begins to form during the 6th-7th week of embryonic life [8]. Interestingly, teeth develop at the same time of intrauterine life. This area of interest is analysed in various studies but there is no racial comparison between two different populations. Hence this study fulfills the void of comparing racially by comparing Tamilnadu and Andhra Pradesh population.

Malocclusion can lead to various skeletal deformities in the future if not properly channelized at early stages. Dental caries also may lead to lower oral health related quality of life. Hence lip pattern as a non-invasive tool may lead to predict the possibilities of a person having malocclusion and dental caries. Hence the present study aims to determine a predominant lip pattern for the prediction of malocclusion and dental caries.

### Materials and Methods

**Study Design:** A cross-sectional study

**Study Setting:** The study was done in Saveetha dental college in Chennai, among the dental students who have their origin from Tamilnadu and Andhra Pradesh.

**Study Population:** The inclusion criteria for the present study was the dental students with 18-30 years of age and are from Tamilnadu and Andhra Pradesh. Study included the participants whomever willing and consented to participate in the study. Students with pathological condition of the lip are excluded from the study. A total of 60 students were included in this study. Out of this 60 students 30 students belong to Tamilnadu and 30 students belong to Andhra Pradesh population.

The sample size was calculated using Epi-Info sample size calculation software.

$$N = z^2 p(1-p) / d^2$$

Where,  $z=1.96$  for 95% confidence interval, 1.645 for 90% confidence interval

$p$  = Highest prevalence of dental caries among types of lip pattern i.e. 95%  $d$  = acceptance margin of error i.e. 5%

The sample size was calculated to be 51.

Hence the sample size can be rounded off to 60.

### Study duration

The present study was done in February 2021

### Methodology

For recording lip prints, students were asked to open their mouth widely and apply vaseline around lips, later lipstick was applied evenly in the upper and lower lips in a single motion. They were asked to gently rub both the lips so that lipstick spreads evenly [Fig 1]. Cellophane tape was cut with scissors and pasted in the lips. Then the tape was cautiously removed beginning at one end to the other, preventing any smudging of the print and fixed on the white paper chart [9]. After recording the lip pattern, the recordings were separated based on origin. Tsuchihashi classification was used for determining the type of lip pattern [10].

### Statistical analysis

Data collected was analysed using the Statistical package of social sciences (SPSS) Version 23. Chi-square test was used to determine the association between lip pattern with Angle's molar relationship and dental caries status.

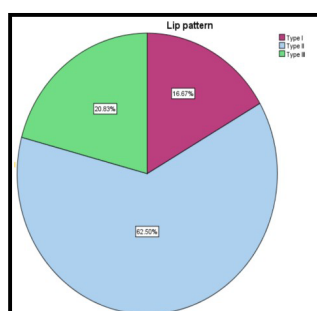
### Results

All the lip prints were cautiously observed and patterns were verified. Out of the 60 people, 30 were from Andhra Pradesh and 30 were from Tamil Nadu. 50% of the study participants were males and 50% were females. Among Tamil study participants, lip patterns were distributed as Type I (16.67%), Type II pattern

Figure 1. Recording lip print.



Figure 2. Distribution of lip pattern among Tamil study participants.



(62.5%), Type III pattern (20.83%). [Figure 2]. Among the Telugu study participants, the lip patterns were distributed as Type I (19.44%), Type II pattern (58.33%), Type III pattern (22.22%) [Figure 3].

Correlating the determined lip patterns of Tamil nadu and Andhra study participants, there was a significant association between lip pattern with malocclusion status ( $p$ -value=0.000) (Table 1) (Figure 4). Angle's class I molar relationship was most common among participants with Type II lip pattern (38.33%), Angle's class II molar relationship was most common among participants with Type II lip pattern (18.33%) and 13.33% of participants with type III lip pattern had class III molar relation suggesting that participants with type III lip pattern was more prone to get malocclusion. None of the study participants with Type III lip pattern had Angle's class 1 molar relationship. There was a significant association between lip pattern and dental caries status of the population ( $p$ -value=0.005) (Table 2) (Figure 5). DMFT score of less than 3 was reported among 56.67% of participants with type II lip pattern. More than DMFT score 3 was common among type I lip pattern participants (6.67%), suggesting that participants with type II lip pattern had less caries experience when compared with

type I and III lip patterns.

### Discussion

Lip print pattern is unique to an individual and hence this anatomical character of the human lips may be useful in identification and diagnosis of congenital diseases and anomalies [11, 12]. Since the facial structures like lip, alveolus, teeth and palate are formed from the same embryonic tissues, this study was done on the basis of co-relating lip patterns with most prevalent oral conditions, i.e. dental caries and malocclusion [13].

In this study, type II lip pattern was mostly prevalent in both tamil and telugu population. There was a significant association between lip pattern and DMFT index, malocclusion status. Most of the students with type II lip pattern had class I angle's molar relationship. Most of the students with type II lip patterns had DMFT scores less than 3.5. Hence lip pattern is a good marker for identification of dentition and malocclusion and can be widely used in forensics. This proves that in forensics the soft tissue analysis like lip pattern can be used to predict the status of hard tissue.

Figure 3. Distribution of lip pattern among Telugu study participants.

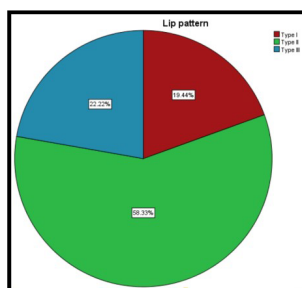


Figure 4. Bar chart depicts association between lip pattern and DMFT Index.

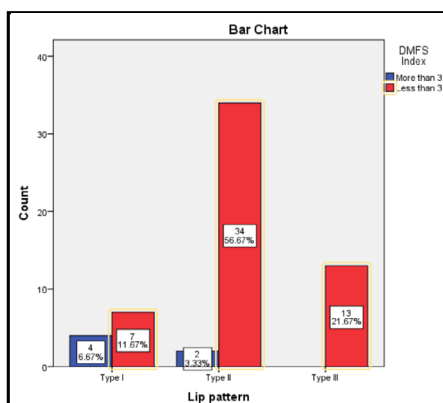


Figure 5. Bar chart depicting the association between lip pattern and Angle's malocclusion group.

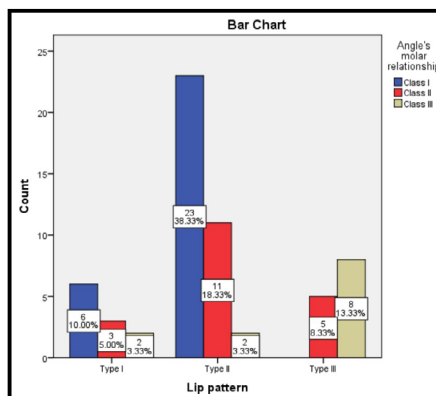


Table 1. Association between Lip pattern and DMFT Index.

| Lip pattern | DMFT Index score |             | Total      | Chi- Square value | P- value |
|-------------|------------------|-------------|------------|-------------------|----------|
|             | More than 3      | Less than 3 |            |                   |          |
| Type I      | 4(6.67%)         | 7(11.67%)   | 11(18.34%) | 10.73             | 0.005    |
| Type II     | 2(3.33%)         | 34(56.67%)  | 36(60%)    |                   |          |
| Type III    | 0                | 13(21.67%)  | 13(21.67%) |                   |          |
| Total       | 6(10%)           | 54(90%)     | 60(100%)   |                   |          |

Table 2. Association between lip pattern and Angle's molar relationship group.

| Lip pattern | Angle's molar relationship |            |           | Total      | Chi-square | P-value |
|-------------|----------------------------|------------|-----------|------------|------------|---------|
|             | Class I                    | Class II   | Class III |            |            |         |
| Type I      | 6(10%)                     | 3(5%)      | 2(3.33%)  | 11(18.33%) | 23.43      | 0.000   |
| Type II     | 23(38.33%)                 | 11(18.33%) | 2(3.33%)  | 36(59.9%)  |            |         |
| Type III    | 0                          | 5(8.33%)   | 8(13.33%) | 13(21.6%)  |            |         |
| Total       | 29(48.33%)                 | 19(31.63)  | 12(19.9%) | 60(100%)   |            |         |

Previous studies also suggest that lip prints can be used to predict the malocclusion status in study done by Vignesh et al, in this study type II pattern was the most predominant pattern like the current study [14]. In this study type I lip pattern was more common for class I malocclusion, Type IV lip pattern was more common for class II malocclusion. For class III malocclusion males showed an increased type II pattern and females showed an increased type IV pattern. In another study done by Pradeep Raghav et al, the prevalence of vertical lip pattern was significantly higher in subjects having skeletal class III malocclusion [15]. In this study branched lip pattern was most common in the North Indian adult population. The study done by Srishti et al, the author concluded the study by suggesting lip print will help in criminal investigations and also help in predicting type of malocclusion beforehand for the successful execution of preventive and interceptive procedures [16]. This study proved that in skeletal Class I group partial vertical groove lip pattern was most prevalent.

Study done by Anuradha et al, the results were skeletal class I group showed more branched pattern. Other patterns in decreasing order were intersected, reticular and vertical lip patterns while skeletal class II group showed branched patterns as most common [17]. In a study conducted by Govindarajan et al, type II branched pattern had highest caries prevalence another

study conducted by Madhusudan et al, concluded that prevalence of dental caries was higher among subjects with type II lip pattern but in the current study participants with DMFT score was less than score 3 in type II lip pattern group which showed less caries prevalence. [18, 19]

Limitations of the current study is that the results cannot be generalised to the whole population of Tamilnadu and Andhra Pradesh population as only the students with 18-30 age group were assessed. Future scope of this study aims to study the cheiloscopia pattern to predict dental caries and malocclusion status in a large population.

## Conclusion

Type II lip pattern was the most common lip pattern among the study participants and was related with less caries experience and Angle's class I molar relation. It can be concluded from the study that lip pattern can be used as a predictive tool to determine the dental caries prevalence and malocclusion status.

## References

1. Remya S, Priyadarshini T, Umadethan B, Gopalan M, Jeyaseelan N. Cheiloscopia—A study of lip prints for personal identification. *IOSR Journal of Dental and Medical Sciences*. 2016;15(2):101-3.
2. Jatti D, Rastogi P. Digital analysis of lip prints for personal identification: A cross sectional study in South Indian population. *Journal of Indian Academy of Forensic Medicine*. 2015;37(3):289-93.
3. Ravikumar R, Darshan C. Cheiloscopia: The study of lip prints in sex determination. *International Journal of Medical Toxicology & Legal Medicine*. 2019;22(1and2):88-91.
4. Scapini A, Feldens CA, Ardenghi TM, Kramer PF. Malocclusion impacts adolescents' oral health-related quality of life. *Angle Orthod*. 2013 May;83(3):512-8. Pubmed PMID: 23210545.
5. Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez E, et al. Dental caries. *Nat Rev Dis Primers*. 2017 May 25;3:17030. Pubmed PMID: 28540937.
6. Jung MH, Heo W, Baek SH. Effects of malocclusion on the self-esteem of female university students. *Korean Journal of Orthodontics*. 2008.
7. Latham RA. The pathogenesis of the skeletal deformity associated with unilateral cleft lip and palate. *Cleft Palate J*. 1969 Oct;6:404-14. Pubmed PMID: 5260746.
8. Agarwal M, Alex A, Konde S. Relationship between Dermatoglyphics, Cheiloscopia, Rugoscopy, and Dental Caries: A Cross-sectional Study in Bengaluru, Karnataka. *Contemp Clin Dent*. 2018 Oct-Dec;9(4):577-581. Pubmed PMID: 31772466.
9. Verghese AJ, Vidyullatha VS, Shashidhar CM. A comparison of the methods for the recording of lip prints. *Medico-Legal Update*. 2010 Jan;10(1):62-3.
10. Suzuki K, Tsuchihashi Y. New attempt of personal identification by means of lip print. *J Indian Dent Assoc*. 1970 Jan;42(1):8-9. Pubmed PMID: 5269498.
11. Sharma P, Saxena S, Rathod V. Comparative reliability of cheiloscopia and palatoscopy in human identification. *Indian J Dent Res*. 2009 Oct-Dec;20(4):453-7. Pubmed PMID: 20139570.
12. Caldas IM, Magalhães T, Afonso A. Establishing identity using cheiloscopia and palatoscopy. *Forensic Sci Int*. 2007 Jan 5;165(1):1-9. Pubmed PMID: 16725290.
13. Lopes LD, Mattos BS, André M. Anomalies in number of teeth in patients with lip and/or palate clefts. *Braz Dent J*. 1991;2(1):9-17. Pubmed PMID: 1819360.
14. Ravindra V, Rekha CV, Annamalai S, Sharmin DD, Norouzi-Baghkomeh P. A comparative evaluation between cheiloscopia patterns and the permanent

- molar relationships to predict the future malocclusions. *J Clin Exp Dent*. 2019 Jun 1;11(6):e553-e557. Pubmed PMID: 31346376.
- [15]. Raghav P, Kumar N, Shingh S, Ahuja NK, Ghalaut P. Lip prints: The barcode of skeletal malocclusion. *J Forensic Dent Sci*. 2013 Jul;5(2):110-7. Pubmed PMID: 24255559.
- [16]. Aditi S, Tikku T, Khanna R, Maurya RP, Verma SL, Srivastava K, et al. Cheiloscopy: Association of lip prints in different skeletal malocclusions. *International Journal of Orthodontic Rehabilitation*. 2019 Oct 1;10(4):156.
- [17]. Pandey A, Kumar N, Nabi AT, Kavita K, Choudhary P, Raj R. Correlation between lip print patterns and skeletal class I and II malocclusions—A tool to diagnose early. *Journal of Family Medicine and Primary Care*. 2020 Jul;9(7):3539.
- [18]. Jagthap SS, Chandrakala B, Sumathy G, Bhaskaran Sathyapriya A. Relationship between Lip Print and Dental Caries Survey Article. *European Journal of Molecular & Clinical Medicine*. 2020 Dec 16;7(10):576-81.
- [19]. Agarwal M, Alex A, Konde S. Relationship between Dermatoglyphics, Cheiloscopy, Rugoscopy, and Dental Caries: A Cross-sectional Study in Bengaluru, Karnataka. *Contemp Clin Dent*. 2018 Oct-Dec;9(4):577-581. Pubmed PMID: 31772466.