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Cheiloscopic Patterns as Predictors of Gingivitis and Chronic Periodontitis: A Cross-Sectional Study

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Abstract
Background:
Cheiloscopy, the study of lip-print patterns, is a simple, noninvasive method traditionally used for personal identification. Since periodontal diseases show strong genetic influence and individuals vary in their susceptibility to gingivitis and chronic periodontitis, exploring cheiloscopic patterns may help identify potential hereditary markers linked to periodontal disease risk.
Aim:
To assess the association between cheiloscopic patterns and periodontal disease status in patients with gingivitis and chronic periodontitis.
Materials and Methods:
A cross-sectional study was conducted on 100 patients, divided into two equal groups: Group I (gingivitis) and Group II (chronic periodontitis). Lip prints were recorded using cellophane tape after applying lipstick and analyzed with a 10× magnifying glass according to the Tsuchihashi classification (1974). The distribution of lip-print patterns was compared between both groups, and data were subjected to statistical analysis to evaluate significant associations.
Results:
A significant correlation was observed between cheiloscopic patterns and periodontal disease severity. Type II lip-print pattern was most prevalent among patients with gingivitis, whereas Type IV pattern appeared predominantly in chronic periodontitis patients. The comparison of pattern distribution showed statistically significant differences between the two groups, indicating a potential relationship between lip morphology and periodontal susceptibility.
Conclusion:
The study highlights that specific cheiloscopic patterns, particularly Type IV, may be associated with increased risk of chronic periodontitis, while Type II is more frequently seen in gingivitis. Cheiloscopy, being noninvasive, simple, and cost-effective, shows promise as an adjunctive screening tool for early identification of individuals at risk for periodontal diseases. Further studies with larger sample sizes and genetic analysis are recommended to validate these findings.
Keywords: *Cheiloscopy, Gingivitis, Lip-print patterns, Periodontitis, Tsuchihashi classification*

I. Introduction

Cheiloscopy, derived from the Greek words *cheilos* meaning "lips" and *skopein* meaning "to examine," refers to the scientific study of the characteristic patterns of grooves and fissures present on the vermilion border of the lips [1]. These unique patterns, known as lip prints, remain stable throughout an individual's lifetime and

possess a degree of distinctiveness comparable to fingerprints. Owing to this uniqueness, cheiloscopy has traditionally been explored in forensic sciences as a reliable tool for personal identification. Over time, advancements in diagnostic sciences have expanded its applications beyond forensic investigations, prompting interest in its potential relevance in clinical and epidemiological research [2].

Periodontal diseases, including gingivitis and chronic periodontitis, continue to pose a major public health challenge worldwide. These conditions arise from the complex interplay between microbial plaque biofilm, host immune responses, and a variety of modifying environmental and genetic factors [3]. While dental plaque serves as the primary etiological agent, it is now well recognized that the presence of pathogens alone does not fully explain why some individuals develop severe periodontal destruction while others remain unaffected under similar environmental exposures. This variability highlights the substantial contribution of genetics, constitutional differences, and inherent host susceptibility in determining periodontal disease outcomes [4].

Genetic predisposition plays a particularly crucial role in the pathogenesis and progression of periodontitis. Polymorphisms in genes regulating immune responses, inflammatory mediators, and connective tissue metabolism have been associated with increased vulnerability to periodontal breakdown [5]. Moreover, etiological heterogeneity where multiple risk factors and biological pathways contribute to disease onset further complicates early diagnosis and individualized risk assessment in periodontal patients. Hence, the need for simple, noninvasive, and cost-effective tools that may assist in identifying individuals at higher risk for periodontal disease is increasingly recognized in contemporary research [6].

In this context, cheiloscopy is emerging as a promising exploratory tool. Preliminary evidence suggests that lip-print patterns, being genetically determined, may show associations with various hereditary conditions and predispositions [7]. Since periodontal diseases exhibit strong genetic influences, investigating whether specific lip-print types correlate with periodontal status may offer a novel, noninvasive adjunct for early screening. If certain cheiloscopic patterns demonstrate consistent associations with gingivitis or periodontitis, they could potentially serve as hereditary markers indicating heightened susceptibility [8].

Cheiloscopy offers several advantages in this regard: it is simple to perform, requires minimal equipment, is noninvasive, and is cost-effective compared with molecular genetic testing. Additionally, the method is patient-friendly and can be easily applied in diverse settings, including community-based screening and epidemiological studies. By exploring the relationship between lip-print patterns and periodontal conditions, researchers may gain insights into underlying genetic predispositions that influence host responses to plaque-induced inflammation [9].

Given the growing emphasis on personalized and preventive dentistry, identifying early markers of periodontal susceptibility is essential. Investigating cheiloscopic patterns as potential predictive indicators may contribute valuable information toward targeted preventive strategies, risk assessment models, and individualized patient management. Thus, the present study aims to assess the association between lip-print patterns and periodontal disease status, particularly distinguishing between gingivitis and chronic periodontitis, to evaluate the potential role of cheiloscopy in periodontal risk profiling.

II. Aim and Objectives

Aim

To assess the association between cheiloscopic patterns and periodontal disease status in patients diagnosed with gingivitis and chronic periodontitis.

Objectives

To record and classify lip-print patterns in individuals with gingivitis and chronic periodontitis using the Tsuchihashi classification.

To compare the distribution of different cheiloscopic patterns between gingivitis (Group I) and chronic periodontitis (Group II) patients.

To evaluate whether specific lip-print patterns correlate significantly with the severity of periodontal disease.

To determine the potential of cheiloscopy as a noninvasive screening tool for identifying individuals at higher risk of developing periodontal diseases.

III. Methodology

A cross-sectional study was conducted on a total of 100 patients reporting to the dental outpatient department. Participants were selected according to predetermined inclusion and exclusion criteria to ensure appropriate representation of the study population. After screening, the subjects were divided into two equal groups of 50 patients each:

Group I: Patients diagnosed with gingivitis

Group II: Patients diagnosed with chronic periodontitis

Periodontal status was evaluated based on clinical parameters such as gingival inflammation, probing depth, and clinical attachment loss. Following clinical examination, lip prints were recorded for each participant. The lips

were cleansed and dried, after which a uniform layer of lipstick was applied to the vermilion border. The lip impression was obtained using cellophane tape and then transferred onto white bond paper for clarity and preservation.

Each lip print was examined under a **10× magnifying glass** to identify and classify the patterns according to the **Tsuchihashi classification (1974)**. The patterns observed were categorized into Types I, II, III, and IV.

All collected data, including the distribution of cheiloscopic patterns in both study groups, were systematically tabulated. Statistical analysis was performed to compare the frequency of lip-print types between gingivitis and chronic periodontitis groups and to determine the presence of significant associations. Appropriate statistical tests were applied, and a p-value < 0.05 was considered statistically significant.

IV. Results

A total of 100 subjects were included in the study, with 50 participants each in the gingivitis group (Group I) and the chronic periodontitis group (Group II). Cheiloscopic pattern analysis revealed distinct differences in the distribution of lip-print types between the two groups.

In Group I (gingivitis), Type II lip-print pattern was the most frequently observed. In contrast, Group II (chronic periodontitis) demonstrated a markedly higher prevalence of the Type IV lip-print pattern according to the Tsuchihashi classification (1974). The frequency distribution of all four cheiloscopic patterns - Types I, II, III, and IV showed noticeable variation between the two study groups.

Statistical comparison of the pattern distribution revealed that the differences between gingivitis and periodontitis patients were highly significant, indicating a strong association between specific lip-print types and periodontal disease status. The predominance of Type IV among periodontitis patients suggests a potential genetic predisposition reflected through cheiloscopic characteristics. Conversely, the higher occurrence of Type II in gingivitis patients supports its association with milder forms of periodontal involvement.

Overall, the findings demonstrate a significant correlation between cheiloscopic patterns and periodontal disease severity, reinforcing the potential utility of lip-print analysis as a noninvasive predictive marker for identifying individuals at risk of developing chronic periodontitis.

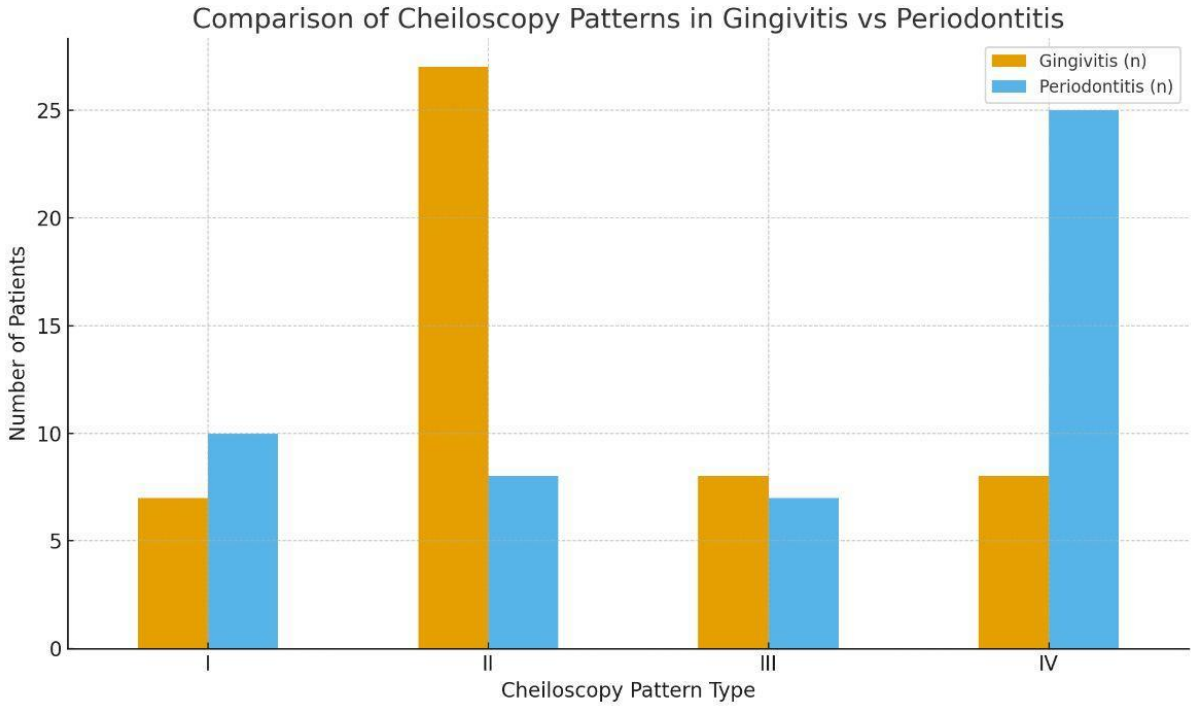

Figure 1: Comparison of cheiloscopic pattern

Figure 1 illustrates the comparison of cheiloscopic pattern distribution between gingivitis and chronic periodontitis patients. As shown in the chart, Type II lip-print pattern is the most prevalent among patients with gingivitis (n = 27), followed by Types I and III (n = 7 and n = 8, respectively). In contrast, patients with chronic periodontitis exhibit a significantly higher frequency of the Type IV pattern (n = 25), indicating a strong association with disease severity. Types I, II, and III appear in much lower proportions among periodontitis patients (n = 10, 8, and 7, respectively).

The graphical comparison clearly demonstrates a distinct shift in cheiloscopic pattern distribution between the two groups, supporting the study's finding that cheiloscopy may serve as a potential predictive marker for periodontal disease severity.

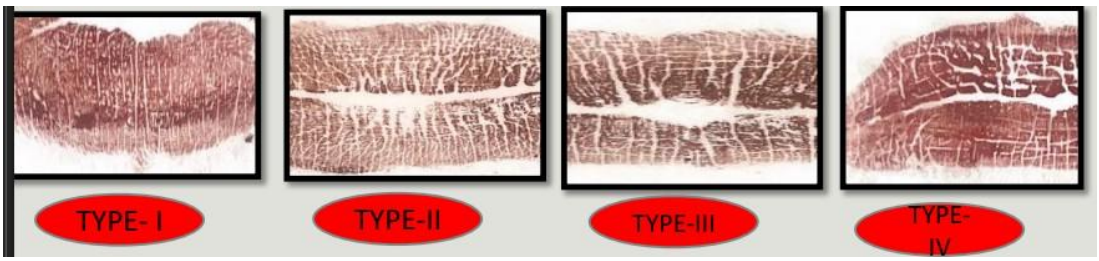

Figure 2: Tsuchihashi classification (1974)

V. Discussion

Cheiloscopy has traditionally been recognized as a forensic tool due to the uniqueness, permanence, and genetic determination of lip-print patterns. However, its potential relevance in medical and dental sciences particularly in conditions influenced by hereditary and host-response factors has gained increasing attention in recent years. Periodontal diseases, including gingivitis and chronic periodontitis, are known to arise from a complex interaction between microbial challenge and individual susceptibility [10]. Although plaque remains the primary etiological agent, the variation in disease progression among individuals exposed to similar environmental factors highlights the role of genetics in periodontal susceptibility. In this context, cheiloscopy emerges as a promising noninvasive method to explore possible hereditary markers connected with periodontal health [11].

The present study demonstrated a significant correlation between lip-print patterns and periodontal disease status. The predominance of Type II lip prints among patients with gingivitis and the markedly higher frequency of Type IV patterns in patients with chronic periodontitis suggest that lip-print morphology may reflect underlying genetic or constitutional factors that influence host response to periodontal inflammation [12]. These findings are consistent with the understanding that individuals with a heightened inflammatory response, altered immune regulation, or genetic predispositions may show greater progression to chronic periodontitis [13].

The differentiation in cheiloscopic pattern distribution between gingivitis and periodontitis also supports the concept of multiple susceptibility profiles within the population. While gingivitis is generally reversible and associated with plaque accumulation, chronic periodontitis involves irreversible tissue destruction influenced by both environmental and genetic components. The higher incidence of the Type IV pattern in periodontitis patients may indicate a stronger genetic predisposition within this group, which aligns with previous research suggesting genetic polymorphisms as contributors to periodontal breakdown [14].

Another important aspect highlighted by this study is the practicality and noninvasive nature of cheiloscopy. Lip-print recording is simple, cost-effective, and well accepted by patients. Unlike genetic testing or advanced biochemical assays, cheiloscopy requires minimal resources and can be performed easily in clinical and community settings. This makes it a particularly attractive tool for preliminary screening or large-scale epidemiological surveys aimed at identifying individuals with higher susceptibility to periodontal disease [15].
However, it is also important to recognize that while lip-print patterns show promising correlations, they should not be viewed as standalone diagnostic markers. Periodontal disease is multifactorial, and genetic susceptibility represents only one part of the etiological spectrum. Cheiloscopy, therefore, may serve best as an adjunctive tool complementing clinical assessments, risk-factor evaluation, and conventional diagnostic methods [16].

VI. Limitation

The present study has few limitations that should be acknowledged. First, the relatively small sample size of 100 participants restricts the generalizability of the findings to broader populations. As a cross-sectional study, the design captures data at a single point in time, preventing the establishment of causal relationships between cheiloscopic patterns and periodontal disease progression. Additionally, because the study population was limited to a specific geographic and ethnic group, population-related variations in lip-print patterns may influence the applicability of results elsewhere. The analysis of lip prints using a 10× magnifying glass may also introduce observer bias, as inter-examiner reliability was not assessed. Furthermore, the Tsuchihashi classification used in this study may not fully encompass all lip-print variations, potentially limiting the depth of pattern interpretation. Environmental factors such as lip dryness, pressure during print recording, and lipstick application technique could also affect print clarity. Lastly, although the study suggests a possible genetic basis linking lip-print patterns to periodontal susceptibility, no genetic testing was conducted to validate this association.

VII. Conclusion

Overall, the findings of this study contribute to the growing body of evidence supporting the potential role of cheiloscopy in periodontal risk assessment. By establishing significant associations between specific lip-print patterns and periodontal disease severity, this study reinforces the prospect of integrating cheiloscopy into preventive and predictive dental care strategies. Further large-scale studies and genetic correlation research would be valuable to strengthen the diagnostic relevance of cheiloscopic patterns and to fully explore their role in personalized periodontal care.

References

[1]. Prithyani S, Mahajan AY, Mitra DK, Mishra AR, Dhakade YB. Assessment of Cheiloscopic Patterns and its Relation in Periodontally Healthy, Gingivitis, and Chronic Periodontitis: A Cross-sectional Study. Bharati Vidyapeeth Journal of Dentistry and Allied Sciences. 2025 Apr 1;2(2):67-71.
[2]. Mukherjee E, Karjodkar F, Das A, Sansare K. Lips and fingertips tell it all-cheiloscopy and dermatoglyphics as predictive factors for dental caries and periodontitis. Inter J Dent Med Sci Res. 2018;2:47-55.
[3]. Khanna C, Sood A, Chaudhry S, Kaur H, Nayyar A, Chopra G. Periodontal Vaccines: Boon or Mere Promise in Modern Dentistry?. Oral Sphere J. Dent. Health Sci. 2026;2(1):57-62. doi: https://doi.org/10.63150/osjdhs.2026.10
[4]. Balaganesh S, Leelavathi L, Indiran MA. 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 Aug 3;8(8):3652-5.
[5]. Saravanan E, Ravindran V, Arthanari A. A comparative evaluation between cheiloscopic patterns and canine relationship in permanent dentition. Journal of Clinical and Experimental Dentistry. 2025 Jun 1;17(6):e718.
[6]. Varghese A. Correlation of Dermatoglyphic and Cheiloscopic Patterns, Along with Assessment of Prevalence of Dental Caries and Skeletal Malocclusion in Children of Age Group 6-14 Years (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).
[7]. Ashifa N, Balasubramaniyam K, Sulthana A, Kennedy S, Viswanathan K, Pavithran VK. Exploring connections among fingerprints, lip prints, and ABO blood groups in periodontitis: A cross-sectional analysis. Journal of Indian Society of Periodontology. 2025 Mar 1;29(2):182-9.
[8]. American Dental Hygienists Association. 2023 Dentsply Sirona/ADHA Graduate Student Research Abstracts. American Dental Hygienists' Association. 2023 Dec 1;97(6):54-9.
[9]. Khara N, Shilpa BS, Sinha S, Baliga V, Vasudevan SD. Association between ABO blood groups and dermatoglyphics with periodontal status among individuals: A pilot study. Journal of Datta Meghe Institute of Medical Sciences University. 2020 Oct 1;15(4):582-5.
[10]. Prabhu RV, Dinkar AD, Prabhu VD, Rao PK. Cheiloscopy: revisited. Journal of forensic dental sciences. 2012 Jan 1;4(1):47-52.
[11]. Abidullah M, Kumar MN, Bhorgonde KD, Reddy DS. Cheiloscopy and dactyloscopy: Do they dictate personality patterns?. Journal of forensic dental sciences. 2015 May 1;7(2):114-20.
[12]. Jaber M, Varma SR, Hassan M, Hadi K, Khamis A. Assessment of lip print (cheiloscopy) patterns and its use for personal identification and crime investigation: A systematic review and Meta-Analysis. Journal of International Dental and Medical Research. 2023;16(1):331-9.
[13]. Ravindra V, Rekha CV, Annamalai S, Sharmin DD, Norouzi-Baghkomeh P. A comparative evaluation between cheiloscopic patterns and the permanent molar relationships to predict the future malocclusions. Journal of clinical and experimental dentistry. 2019 Jun 1;11(6):e553.
[14]. Regan E, Bradshaw B, Bruhn A, Melvin W, Sikdar S. Cheiloscopy patterns in individuals with and without parafunctional oral habits: A cross-sectional observation pilot study. International Journal of Dental Hygiene. 2023 Nov;21(4):755-60.
[15]. Regan ES, Bradshaw BT, Bruhn AM, Melvin W, Sikdar S. Population Variations of Cheiloscopy Patterns: A Cross-Sectional Observation Pilot Study. Journal of Dental Hygiene. 2023;97(5).