



CHEILOSCOPY & DERMATOGLYPHICS – TWO SIDES OF A COIN: AN ORTHODONTIC REVIEW

Orthodontology

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ABSTRACT

An Orthodontist's research to predict malocclusion is being revised every day. Cheiloscopia & dermatoglyphics have entered into this in recent past and given off its sparks. This article briefly describes the cheiloscopic & dermatoglyphic patterns seen in different malocclusions by reviewing the literatures and also tries to correlate them.

KEYWORDS

Cheiloscopia, Dermatoglyphics, Malocclusion

INTRODUCTION

Cummins and Midlo in 1926 coined the term Dermatoglyphics which is the study of the intricate dermal patterns & ridge configuration from palms, soles, fingers and toes.^{1-5,7,8} These patterns are unique to an individual and remain unchanged till death. Even fingerprints are not similar in monozygotic twins too.⁶ Dermatoglyphics has proved its applications in fields such as criminology, cytogenetic studies & anthropology.¹⁴ But the concept of using fingerprints in determining malocclusion is not widely popular because of the lack of knowledge. Dermatoglyphics and dental occlusion is closely related due to the fact that dentition, palate and dermal patterns develops during the same period.

Similarly lip prints are also unique to an individual. The study of wrinkles and grooves on the labial mucosa i.e. lip prints, is referred to as Cheiloscopia.⁹ Fischer, an anthropologist in 1902 was the first to study about lip prints. They can be used for personal identification, criminal investigations and cytogenetic studies.¹⁰⁻¹⁴ The relation between lip prints and malocclusion has been an area of vast research because skeletal malocclusion and soft tissue morphology are interrelated.

Various classification systems have been reported for cheiloscopic patterns. Few of them are listed in **Table 1**.

Table 1: Different Classification Systems Of Lip Prints

Suzuki and Tsuchihashi ^{11,15}	Renaud's ¹⁶	Afchar Bayat ¹⁶	Kasprzak ¹⁷	Santos ¹⁸
Type 1 - clear cut groove running vertically across the lips Type 1' -straight groove that disappear half way into the lip instead of covering the entire breadth of the lip or partial length of groove of Type 1 Type 2 - grooves that fork in their course or a branched groove Type 3 -intersected groove Type 4 -reticular groove Type 5 - cannot be differentiated morphologically	Type a - complete vertical Type b - incomplete vertical Type c - complete bifurcated Type d - incomplete bifurcated Type e - complete intersecting Type f -incomplete intersecting Type g - reticulated Type h - sword Type i - horizontal Type j - other types	A1 - vertical and straight grooves covering the whole lip A2 - like the former, but not covering the whole lip B1 - straight branched groove B2 - angulated branched groove C - converging grooves D - reticular pattern grooves E - other grooves	Linear, L Bifurcate, R Reticular, S Undetermined, N	Simple <ul style="list-style-type: none"> • Straight • Curved • Angled • Sine-Shaped • Compound • Bifurcated • Trifurcated • Anomalous

The commonly used classification system for fingerprints was proposed by **Galton** based on the number of triradii present.¹

- Simple arch- no triradius
- Loop- one triradius

1. Radial -opens towards radial margin

2. Ulnar- opens towards ulnar margin

- Whorl- two/three triradii

Numerous studies have been conducted to identify whether lip prints & fingerprints are possible markers for malocclusion. This article tries to summarize these studies in brief (**Table 2 & 3**) and compares the results.

Table 2: Studies On Cheiloscopia & Malocclusion

Author & year	Journal	Study	Inference
Kulkarni ¹⁹ , et al, 2012	Journal of Forensic Dental Sciences	Correlation between lip prints and sagittal jaw relation	Larger sample size is required to get valid results
Karki et al, 2012 ²⁰	Kathmandu Univ Med J	Association between lip prints and malocclusion	Lip print patterns in males and females are significantly different
Raghav, et al, 2013 ²¹	Journal of Forensic Dental Sciences	Correlation of lip prints with skeletal malocclusion	Class III malocclusion exhibit vertical lip print patterns
Ruchi S et al, 2015 ²²	Ind J of Contemp Dent	Relation between lip prints & malocclusion	Significant association was found
Shivani Y, 2015 ²³	NJDSR. Volume 3, Number 1, 2015	Predominant Lip Prints in Skeletal Class III Malocclusion Group	Class III group exhibit following lip print patterns -Vertical clear-cut grooves -Straight grooves which disappear half way instead of covering the entire lip. -Intersecting grooves -Reticulate
Chatra et al, 2016 ¹⁶	International Journal of Forensic Odontology	Review on cheiloscopia	
Saujanya ²⁴ , et al 2016	Journal of Indian Society of Pedodontics and Preventive Dentistry	Dermatoglyphics & cheiloscopia as genetic markers in cleft lip & palate	Genetic markers- proximal branched groove (IIa), O lip pattern, asymmetric Atd angle
Vignesh et al, 2017 ²⁵	Contemporary Clinical Dentistry	Cheiloscopic Patterns and Terminal Planes in Primary Dentition	Mesial step – irregular & reticular pattern Distal step- reticular pattern Flush terminal plane- complete vertical pattern

Ponnusamy S ²⁶ et al, 2017	International Journal of Innovative and Applied Research	Association between lip prints and skeletal Class I & II malocclusion	Branched and vertical patterns are found in Class I & Class III group
Kaushal B ²⁷ et al, 2018	International Journal of Research in Health and Allied Sciences	Association of lip print patterns & sagittal malocclusions in Solan Population	Branched lip pattern was found common in Solan population No significant association was found between lip prints & Skeletal Class I, II malocclusions
Maheswari ²⁸ et al, 2018	Ind J Foren Med & Tox	Relation between lip prints and Angle's molar relation	Class I, II, III- clear vertical groove pattern
Jalannavar P et al, 2018 ²⁹	Int J of Sci Res	Lip prints and malocclusion in children	Class II- undetermined lip pattern, reticular pattern Class III- reticular pattern, intersected pattern
Vignesh and Sharmin, 2018 ³⁰	Journal of Forensic Dental Sciences	Compared cheiloscopy patterns & canine relation in deciduous dentition	Class II canine relation • Males-complete vertical, branched • Females- branched
Vignesh et al, 2019 ³¹	J Clin Exp Dent	Compare lip prints and permanent molar relationships	Class I- complete vertical pattern Class II- reticular pattern Class III Females- reticular Males – branched
Aditi et al, 2019 ³²	International Journal of Orthodontic Rehabilitation	Association of lip prints with different skeletal malocclusions	Class I - Partial vertical groove Class II Div 1- Intersecting groove Class III- Complete vertical groove
Neelampari et al ³³ , 2019	International Journal of Scientific Research	Association between lip prints and Angle's molar relations	Class II -incomplete vertical pattern No correlation found between other malocclusions & lip prints
Allani et al, 2019 ³⁴	International Journal of Clinical Pediatric Dentistry	Relation between lip prints and malocclusion in children from 9-14 years of age	Class II- Clear vertical grooves

Table 3: Studies On Dermatoglyphics & Malocclusion

Author & year	Journal	Inference
Julian Verbov et al, 1970 ³⁵	The Journal of Inv Dermat	Fingerprints can be used to diagnose diseases
Kharbanda O.P et al, 1982 ³⁶	J Ind Dent Assoc	Class I- more radial loops found
Reddy S et al, 1997 ³⁷	J Ind Soc of Pedo and Prev Dent	Class II Div 1 & Div 2- arches and ulnar loops Class III-arches and radial loops
M Trehan et al, 2000 ³⁸	J Ind Orthod Soc	Class I- radial loops & arches Class II Div 1-radial loops & arches Class III- whorls
S Tikare et al, 2010 ³⁹	International Dental Journal	
Lakshmi V, 2013 ⁴⁰	Annals and Essences of Dentistry	Review article on dermatoglyphics & orthodontics
Rajput S et al, 2014 ⁴¹	IJRID	Class I- whorls Class II and III- Loop pattern
Jindal G et al, 2015 ⁴²	The Saudi Dental Journal	Class II- whorls Class III- plain arches
Divyashree et al, 2016 ⁴³	J Dent Med Sci	Class I- whorls Class II - Ulnar Loops
Eslami N et al, 2016 ⁴⁴	Elect Phy	Class I, II, III- loop pattern
Baswaraj H et al, 2016 ⁴⁵	Journal of International Oral Health	More severe malocclusion- loop pattern increased and whorl pattern decreased
Jaskiran Kaur, Vijender Khokhar and Anuradha Pathak, 2016 ⁴⁶	International Journal of Recent Scientific Research	Class II- whorls Ideal occlusion- Ulnar loop pattern No pattern is specific for a particular malocclusion group
Jain et al, 2016 ⁴⁷	International Journal of Contemporary Medical Research	Review article on role of dermatoglyphics in dentistry
Deepti et al, 2016 ⁴⁸	Indian Journal of Oral Health and Research	Class II- loop pattern
Achalli et al, 2016 ⁴⁹	International Journal of Orthodontic Rehabilitation	Review on dermatoglyphics & orthodontics
George SM et al, 2017 ⁵⁰	J Clini and Diag Res	Class II with maxillary excess- whorl pattern Class II with mandibular deficiency- whorl pattern Class III with mandibular excess- loop pattern Class III with maxillary deficiency- loop pattern
Achalli S et al, (2018) ⁵¹	J Dent Indones	Class I, II- Loop pattern Class III- whorl pattern
Charles et al, 2018 ⁵²	Indian Journal of Dental Research	Class I- arch pattern Class II- whorl pattern Class III- loop pattern Ideal occlusion- loop pattern
Asnani et al, 2018 ⁵³	International Journal of Oral Care and Research	Review article about role of hand prints in dentistry
Mohil A et al, 2018 ⁵⁴	J Dental Sci	Review on dermatoglyphics
Nivedita Sahoo, 2018 ⁵⁵	J Int Soc Prev Community Dent	Dermatoglyphics & growth pattern Vertical growth pattern- ulnar loops Horizontal growth pattern- whorls
Shetty et al, 2019 ⁵⁶	Journal of Datta Meghe Institute of Medical Sciences University	Normal occlusion-loop ridge pattern Class I malocclusion- whorl pattern Class III- loop ridge pattern

Subramanian et al, 2019 ⁵⁷	Journal of Pharmacy and Bio allied Sciences	Dental arch form & fingerprint patterns <ul style="list-style-type: none"> • square or ovoid arch form- whorls • ovoid or tapered arch form- ulnar loop • tapered arch form- radial loop
Tanveer ⁵⁸ Alam and Prashant Nahar, 2020	Acta Scientific Dental Sciences	Review on role of dermatoglyphics in dental malocclusion

CONCLUSION

From the data we can clearly understood that no lip/finger print pattern is unique for a particular malocclusion. It may vary depending on the gender, environment, race etc. Most of the studies reported that vertical groove (lip print) & loop (fingerprint) patterns are predominantly seen in Class III malocclusion, but further studies with adequate sample size are required to obtain stable results.

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