

Assessment of Dermatoglyphic Patterns and its relation in Periodontally Healthy, Gingivitis and Chronic Periodontitis Patients: A Cross Sectional Study

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Submitted on: 29/01/2024

Accepted on: 21/04/2024

Published on: 01/05/2024

Abstract:

Aim: To Assess the Dermatoglyphics Patterns and its relation in Periodontally Healthy, Gingivitis and Chronic periodontitis Patients.

Material methods: A cross-sectional study was undertaken on 225 subjects of age 18–60 years. The participants equally distributed into three groups, with each group consisting of 75 patients: Group 1 for healthy individuals, Group 2 for gingivitis, Group 3 for chronic periodontitis. The fingerprint patterns of all participants within each group were acquired and analyzed with the help of a magnifying glass. Subsequently, the gathered data was subjected to statistical analysis.

Results: The prevalence of whorl pattern was high in periodontally healthy patients, plain arch pattern in gingivitis patients and ulnar loop pattern in chronic periodontitis patients.

Conclusion: Dermatoglyphic patterns serve as a non-invasive method to predict periodontal diseases and can also be used to educate potential patients about their susceptibility to these conditions at a later stage in life.

Keywords: Chronic Periodontitis, Dermatoglyphics, Fingerprints, Forensic Dentistry.

Introduction:

Dermatoglyphics is a specialized area of scientific research that examines the patterns of skin ridges found on the fingers, toes, palms, and soles. These patterns specifically refer to the configuration of skin ridges on the finger pads, which collectively form an individual's fingerprints.^{1,2}

Every individual possesses distinct fingerprints that serve as a means of identification. The formation of these fingerprints commences around the 6–7th week of the embryonic period and concludes between 10–20 weeks of gestation.^{2,3} At the same time the development of the facial skeleton and the initiation of tooth formation take place. The epithelium of finger beds, lips, and teeth, develops at the same time of intrauterine life. This could serve as a valuable tool for anticipating congenital abnormalities, intrauterine challenges, or other health conditions influenced by genetic changes.³

Chronic periodontitis is a condition causing the breakdown of the supportive tissues around the teeth, leading to a progressive decline in attachment and bone. It is identified by the receding gums and the development of pockets, making it the predominant type of periodontitis among adults.^{4,5}

Various factors contribute to its onset and progression, with genetics being one of them. However, the current diagnostic

techniques for identifying the genetic roots of periodontitis are costly and require a high level of technical precision. Therefore, dermatoglyphics can serve as an economical and non-invasive alternative for assessing the genetic aspects of periodontitis.^{6,7}

The purpose of this study was to assess dermatoglyphic patterns and their relation in Periodontally Healthy, Gingivitis and Chronic Periodontitis Patients.

Materials Methods:

The current research was put forth in the Department of Periodontology. Subjects were briefed about the study, and their consent was secured prior to commencement. Approval was issued from Institutional Ethics Committee.

The study comprised of 225 participants with an average age between 18 to 60 years. The participants were evenly distributed, consisting of 75 individuals in each group: Group a - Periodontally Healthy, Group b - Gingivitis, and Group c - Chronic Periodontitis.

Inclusion Criteria:

1. Both genders aged between 18 and 60 years
2. Patients reporting to the OPD of the Department of Periodontology have more than 8 teeth per arch.

- Subjects willing to give informed consent and are willing to follow the protocol of the study.

Exclusion Criteria:

- Absence of a digit
- Individuals with conditions or abnormalities preventing the precise recording of fingerprints.
- Smokers
- Pregnant females
- On antibiotics or other medications
- Oral prophylaxis done within the past 6 months

Armamentarium: (Fig.1a)

- Diagnostic instruments

- Magnifying glass
- Stamp pad

Collection Of Fingerprints:

After acquiring informed consent, a detailed case history of each patient was recorded. Clinical measurements - Plaque Index, Gingival Index and Pocket depth was examined.

Each participant was instructed to cleanse their hands with soap to eliminate any dirt. Subsequently, the standard ink method was employed to record the fingerprints of each participant. The collected fingerprints were examined using a magnifying glass and were categorized according to the Galton-Henry classification.¹¹

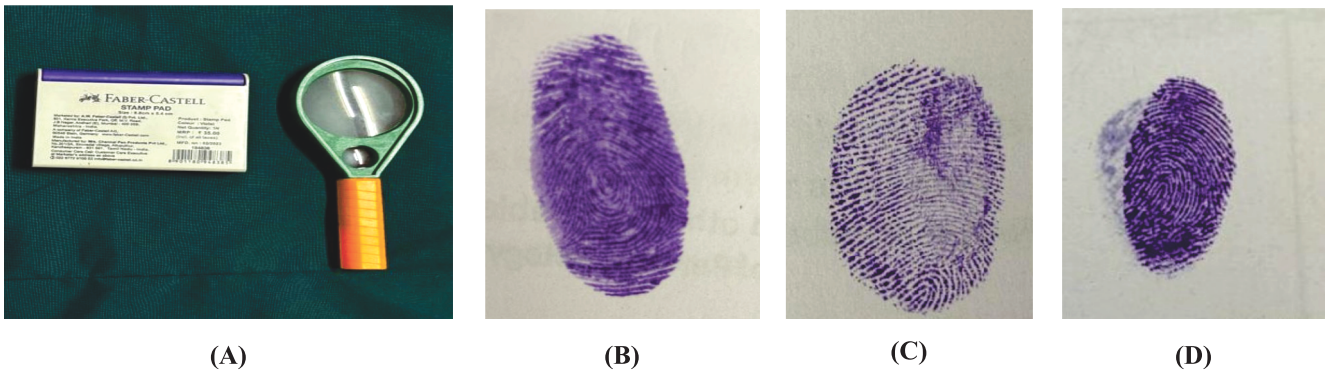


FIG.1 Armamentarium and finger prints (A-Armamentarium, B-Whorl, C-Plain Arch, D-Ulnarloop)

Galton-henry Classification:¹¹



WHORL



PLAIN ARCH



RADIAL LOOP



ULNAR LOOP



CENTRAL POCKET



TENTED ARCH



TWIN LOOP



ACCIDENTAL

Statistical Analysis:

Statistical analysis showed frequency and percentage distribution of the participants according to the dermatoglyphic patterns, which was performed in different groups. A chi-square test was conducted to evaluate notable variances among the groups. A p-value below 0.05 was statistically significant with a confidence level of 95% in the assessment.

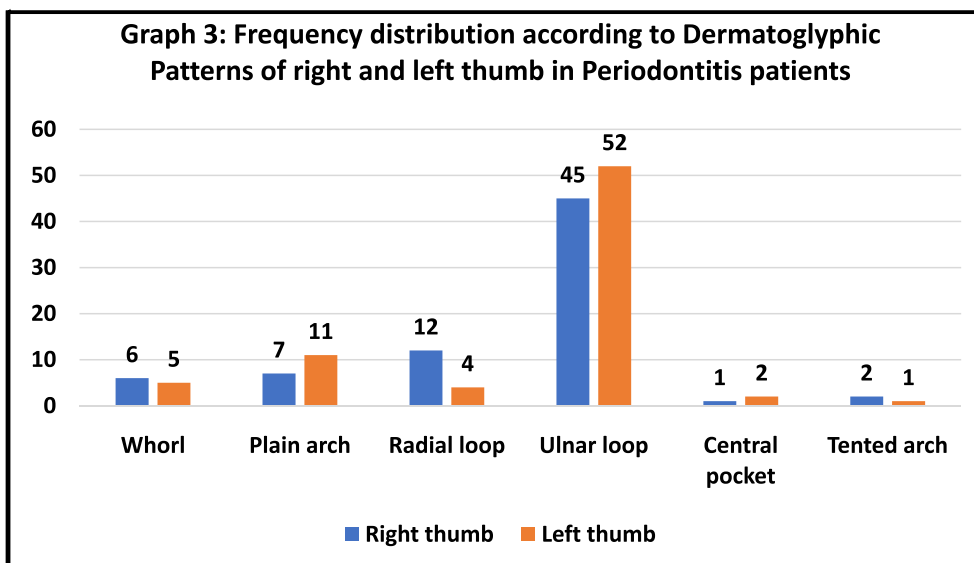
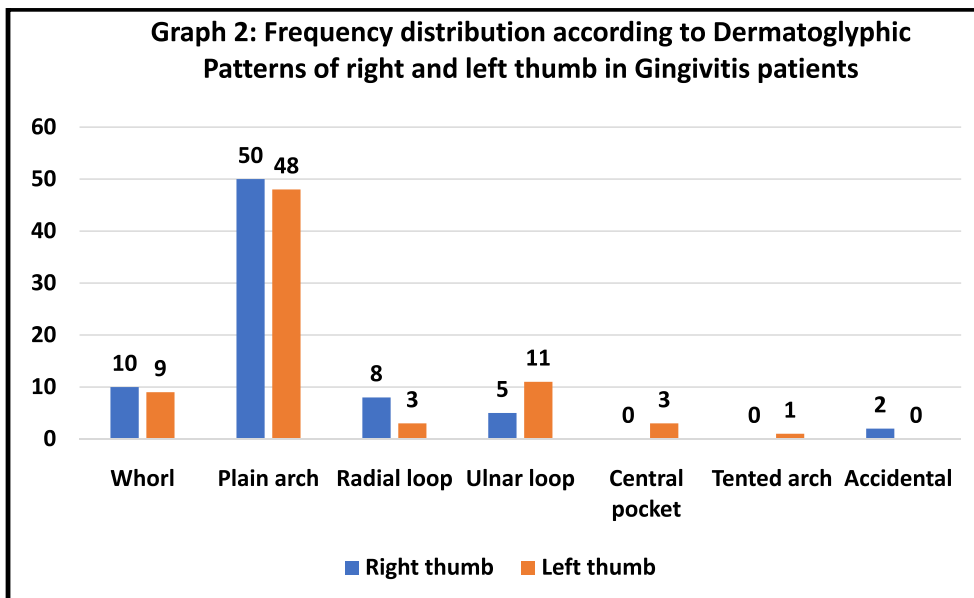
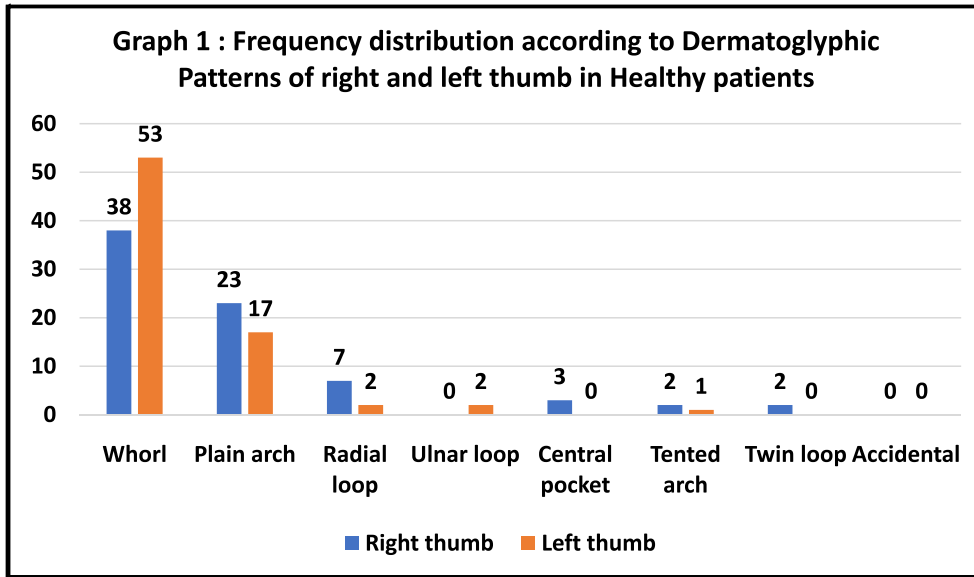
Results:

When fingerprint patterns of patients were compared, it was found that the prevalence of whorl pattern was high in periodontally healthy patients (Graph 1).

The prevalence of plain arch pattern was high in gingivitis patients (Graph 2).

In chronic periodontitis patients, the prevalence of the ulnar loop pattern was highest (Graph 3).

Comparison of the Frequency distribution according to Dermatoglyphic Patterns of the right thumb and left thumb in different groups was assessed using Chi-square test. This comparison revealed statistically significant p-value <0.05 . (Graph 4, Table 1 and Graph 5, Table 2)



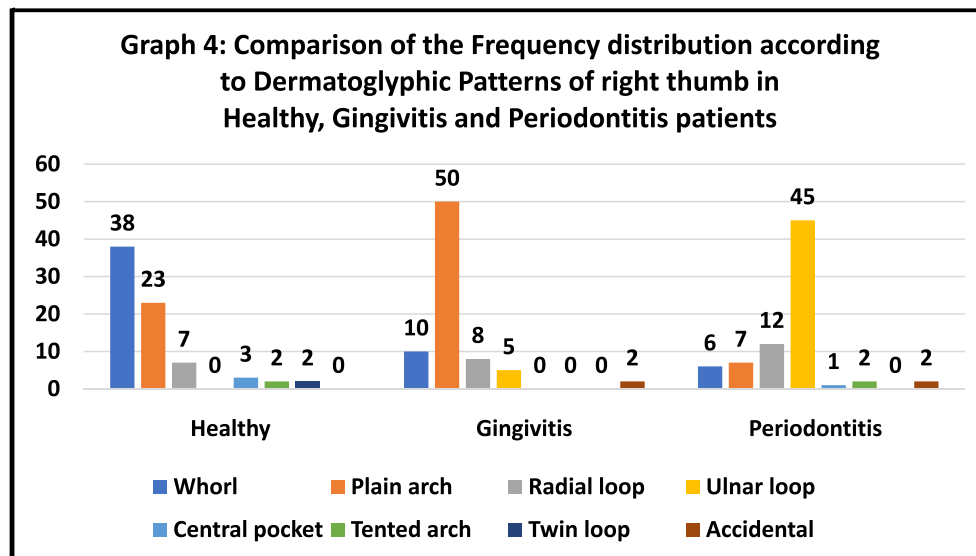


Table 1 - Comparison of the Frequency distribution according to Dermatoglyphic

		Healthy		Gingivitis		Periodontitis	
Dermatoglyphic Patterns		Right thumb		Right thumb		Right thumb	
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Whorl		38	50.7	10	13.3	6	8.0
Plain arch		23	30.7	50	66.7	7	9.3
Radial loop		7	9.3	8	10.7	12	16.0
Ulnar loop		-	-	5	6.7	45	60.0
Central pocket		3	4.0	-	-	1	1.3
Tented arch		2	2.7	-	-	2	2.7
Twin loop		2	2.7	0	0	0	0
Accidental		-	-	2	2.7	2	2.7
Total		75	100.0	75	100.0	75	100.0
p value		0.001*		0.000*		0.013*	

Patterns of right thumb in Healthy, Gingivitis and Periodontitis patients

*p value <0.001 highly significant

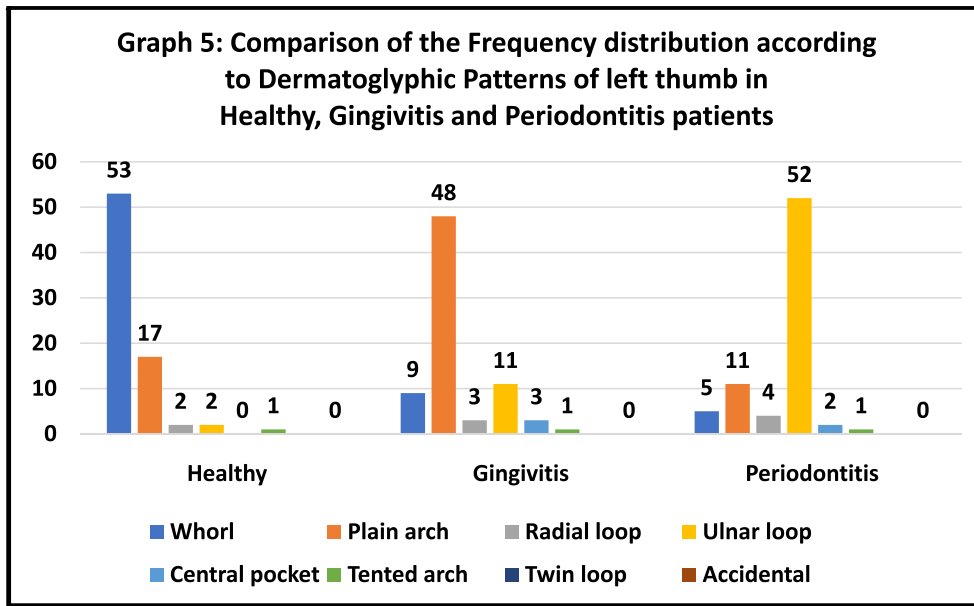


Table 2 - Comparison of the Frequency distribution according to Dermatoglyphic Patterns of left thumb in Healthy, Gingivitis and Periodontitis patients

Dermatoglyphic Patterns	Healthy		Gingivitis		Periodontitis	
	Left thumb		Left thumb		Left thumb	
	Frequen cy (n)	Percen t (%)	Freque ncy (n)	Percen t (%)	Freque ncy (n)	Percen t (%)
Whorl	53	70.7	9	12.0	5	6.7
Plain arch	17	22.7	48	64.0	11	14.7
Radial loop	2	2.7	3	4.0	4	5.3
Ulnar loop	2	2.7	11	14.7	52	69.3
Central pocket	-	-	3	4.0	2	2.7
Tented arch	1	1.3	1	1.3	1	1.3
Twin loop	-	-	-	-	-	-
Accidental	-	-	-	-	-	-
Total	75	100.0	75	100.0	75	100.0
p value	0.010*		0.000*		0.04*	

*p value <0.001 highly significant

Discussion:

Periodontitis is a common dental condition linked to various factors, including environmental, systemic and genetic elements.⁸ Dermatoglyphic pattern analysis can be considered as an advantageous tool in diverse biomedical research.⁸ Dermatoglyphics offer significant advantages as they are fully developed at birth and thereafter remain unchanged for life. Furthermore, the cost-effective nature of scanning and recording impressions make it a convenient procedure that can be carried out without causing any discomfort to the patient.^{9,10}

In the present study, a higher occurrence of the whorl pattern was observed in healthy patients, the plain arch pattern in those with gingivitis and the ulnar loop pattern in patients with chronic periodontitis. Analyzing the frequency distribution of dermatoglyphic patterns in the right and left thumbs among healthy, gingivitis and periodontitis patients demonstrated statistically significant differences.

Dermatoglyphics patterns, when used in conjunction with other diagnostic methods such as clinical and radiographic assessments, can aid in identifying distinct groups of periodontal diseases. Early detection can contribute to preventive measures at a younger age, offering a cost-effective and simpler alternative to many genetic susceptibility tests.

The limitation of this study was that, only patients with chronic periodontitis were evaluated, excluding various other periodontal diseases such as aggressive periodontitis which is known to have a genetic root and familial tendencies. Additionally, the retrospective nature of the study poses limitations and a prospective, longitudinal assessment would be beneficial in determining whether fingerprints genuinely serve as markers for disease susceptibility.

Conclusion:

Dermatoglyphic patterns offer a non-invasive means of predicting the likelihood of developing periodontal diseases. They can also serve as a tool for educating individuals about their susceptibility to these conditions at a later stage in life.

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